

EDITORIAL
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Online Services: Is It Time to Jump?

14 Million Users Hang in the Balance

NETWORK EDITION

Internet Access Management

Enforce Your Web Policies

MAGAZINE



Gadgets!

THE TOP

100



HARDWARE



ACCESSORIES

**EXACTLY HOW SHARP IS THE
PICTURE ON AN NEC MULTISYNC
MONITOR WITH CROMACLEAR?**



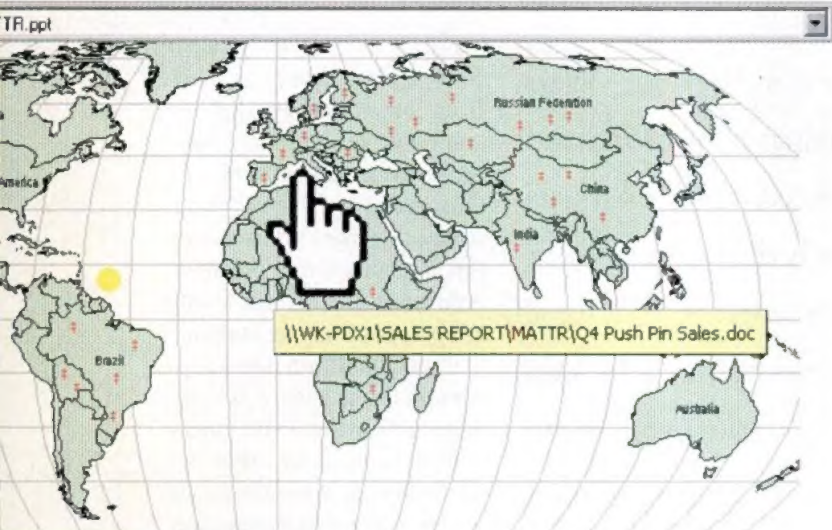
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Microsoft Office 97/now/
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to exotic, far-flung places, like



stant hyperlinks the other side of the office.

Once upon a time on the Web, you could follow any research lead or nutty hobby to the four corners of the planet, link by link by link. And yet you couldn't link your own sales report to a spreadsheet. This state of affairs prompted us to build lots of Web capabilities into new Microsoft Office 97. Now it's ridiculously easy to insert hyperlinks into Office documents: just highlight your future link, click on the hyperlink button, browse to your link destination, and bingo. You've changed a passing reference into an actual link. Since you can publish fully functional Office work on your intranet, you and your colleagues can link to stuff that's actually useful—a spreadsheet that can be updated by a bunch of you simultaneously, for instance. You can also save Office files in HTML, the lingua franca of the Web. Hey, you may even want to send a few of them on a nice long trip. To explore the possibilities further, check out—need we say it?—our Web site.

Desktop Wars Revisited



Remember last year's Browser Wars, where Netscape Navigator and Microsoft Internet Explorer faced off against each other, each desperately debuting new features to top the other's? In the end, we all won, because both products became better, and Web browsing went from the underground to the mainstream.

Now, we're entering a new phase. Instead of arguing about browsers, both companies want nothing less than to control your desktop—and what you see when you turn on your computer. Both want to control the browsing function, your electronic mail, the format of the "push" content you get delivered, and the basic way you view your system. Microsoft's plan, Active Desktop, is a component of Internet Explorer 4.0 and the upcoming Memphis operating system (occasionally called Windows 97, but it looks more like 1998 at this point). Netscape's system, Constellation, builds upon Netscape Communicator 4.0 and fits in with Mercury—its already announced browser for 1998.

Both companies now say that the Browser Wars are over. They're right. Instead, we're entering the Desktop Wars, where the competition now is about how your desktop will look and act. In Microsoft's plan, the desktop is your browser, which you use to look at local, server, or Internet data. In Netscape's plan, a Java-based environment lives on the server, and you will be able to log on anywhere to make that become your primary environment for launching and viewing other applications.

It all sounds inviting, but there's just one problem: I'm not sure I want a browser to be my window on the world. I have nothing against browsers. In fact, I find a lot of useful and interesting information on the Internet and end up using a browser a lot of the time. But I don't think I'm quite ready to make either browser my main interface.

To begin with, I'm concerned about security. We've already seen hackers find bugs in Internet Explorer 3.0 that allow a site to take control of some minor functions on your computer. What happens when the browser becomes the basis for your desktop OS?

Similarly, we've already seen security breaches in

Netscape's products as well. Both companies have done an admirable job of fixing these problems as soon as someone finds them, but this stuff is all so new that there's no way they can anticipate every problem. And as it is, I'm not really happy with browser stability.

I've talked with many supporters of a Java OS who adamantly maintain that there will never be a virus that can

attack such a system. I don't believe it. Where there's a will, there's a way. Particularly when many computer science students see finding a new hack as the way to a good job.

Even assuming that the security problems get solved, I'm still not convinced that a browser is really the perfect user interface. Graphical views are easier for most people to understand than the tree structure of the Windows Explorer—and no one really objects to more and better documentation. On the other hand, browsers may let IS departments add information to these views.

Sometimes when I turn on my system, I want to browse the Internet. But other times I just want to go into my word processor or spreadsheet or database. Or perhaps I want to load a game or education CD-ROM. Remember those applications? They may not be sexy, but they still represent many of the reasons why we work on and enjoy computers. Today's Windows desktop already takes too long to boot; why do I want the overhead of starting a browser first?

I know, I'm sounding like all those people who objected to a graphical desktop in the first place. After all, a graphical user interface is prettier and easier for most people to understand, but it's not as fast. Most of us who started out with the command line got used to Windows—and even learned to like it.

I might get used to and appreciate the browser as a UI. I'm just not convinced that the time is now.

A stylized, handwritten signature of Michael J. Miller in black ink.

MICHAEL J. MILLER

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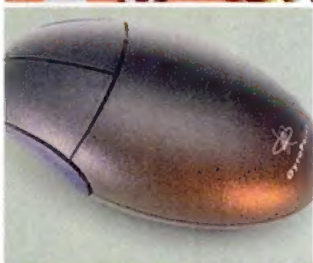
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Top 100 Hardware Accessories

BY BILL HOWARD Gizmos, thingamabobs, and whatchamacallits. We've gathered all kinds of devices to help you do things faster, better, smarter, and with style. Some are absolute essentials, some are pure fun. Either way, you're gonna love this collection100



Five Essential Upgrades.....	102
A Baker's Dozen for the PC Junkie.....	113
Work in Comfort.....	114
Better Mice and Keyboards.....	116
Power and Control.....	120
Hard Copy Helpers.....	123
Gamer's Heaven.....	124
Kid Stuff.....	133
Keep It Neat.....	136
Contacting the Vendors.....	139

SPECIAL PULLOUT SECTION

Gadgets To Go



We can't save you from lost hotel reservations and missed connections at airports. But we can offer up 20 more products to make life on the road a lot easier—from tools for connecting in tough places to aids for making presentations go more smoothly. This one's a keeper105

Tools for the Mobile Professional.....	106	Tools for Taking Your Show on the Road.....	108	Contacting the Vendors.....	108
--	-----	---	-----	-----------------------------	-----

ONLINE



What's New Online

Connections

In this issue, we ask whether now is the time to abandon traditional online services for the convenience of an Internet service provider. Join us online at www.pcmag.com to find the fastest, cheapest, and most convenient ways to get connected to the Web.

UP FRONT

From the Editor-in-Chief.....	4
Pipeline.....	9
Letters.....	21
Trends.....	28
► Digital fingerprints spell bad news for software pirates	
► City guides localize the Web	
► Inside PC Labs	
► Rock concerts and PC theaters from Intel?	

First Looks.....	45
► Couch-potato PCs: 4 PC/TVs	
► U.S. Robotics x 2 Modems	
► NEC vs. 6200MX	
► Omnifile Pro	
► Borland C++ Builder vs. Microsoft Visual C++	



Second Looks.....	81
► Kensington Mouse Works	
► CordDraw Patches	
► Bug Briefs	

COLUMNISTS

JAKE KIRCHNER.....	30
BILL MACHRONE.....	85
JOHN C. DVORAK.....	87
INSIDE TRACK.....	89
JIM SEYMOUR.....	93
BILL HOWARD.....	95

ONLINE SERVICES

Is It Time to Jump?

America Online 3.0	143
CSI 3.0	150
The Microsoft Network	154
Prodigy Internet	159

Suitability to Task	141
Editors' Choice	143
Is an ISP Right for You?	146
Summary of Features	154

BY JIM BARTIMO If you've even thought about bailing out of your online service, you've come to the right place. The major services have all matured in different directions, so it may be time for a switch141



Big Business for Windows 2.0	205
DacEasy Accounting & Payroll for Windows 95 3	206
DacEasy Instant Accounting 2.1	209
Great Plains Profit 2.10	209
M.Y.O.B. Accounting 7.0	212
One-Write Plus 6.0	215
Pacioli 2000 4.1	215
Peachtree Complete Accounting for Windows 4.0	216
Peachtree First Accounting 2.0 for Windows	218
QuickBooks Pro 5.0 for Windows	218
Simply Accounting for Windows 5.0	220
Beyond Bookkeeping	203
Editors' Choice	205
Still Using DOS?	206
Suitability to Task	208
Moving into the Big Leagues	211
Summary of Features	214

ACCOUNTING SOFTWARE

Easy Money



BY M. DAVID STONE Whatever your removable storage needs, we've got you covered with this roundup of 22 leading products. But they're not interchangeable, so choose wisely. From Zip drives to tape, we assess it all.....163

REMOVABLE STORAGE

Unlimited Options

Avatar Peripherals Shark 250	172
Avatar AR-3210NS	172
Fujitsu DynaMO 230	176
Portable PC Card Drive	176
Fujitsu DynaMO 640	176
HP SureStore Optical 2600fx Multifunction Disk Drive	176
Iomega Zip Drive and Jaz Drive	180
Maxoptix T4-2600	184
MDI SCSI Express 2600SL	187
Nomai 540	187
Olympus SYS.230 Universal	188
Olympus PowerMO 2600/SCSI	188
Q.R. Technology a-drive	188
Panasonic PD Drive	191
Pinnacle Micro Tahoe 640 MB and Apex 4.6 GB	191
Sony Spressa CSP-9411-S, SDT-2000E, and CM0-R540-10	193
SyQuest EZFlyer 230 and SyJet	195
Toray Phasewriter Dual	196
Editors' Choice	165
Capacity and Performance for Every Need	166
Suitability to Task	171
Swap the Drive, Not Just the Data	174
Performance Tests	182
Summary of Features	190



BY KATHY YAKAL Today's small-business accounting packages are anything but low-end in their feature sets; they're easier to use than ever and well priced. Most pack all the punch you need to cover the basics safely—general ledger, accounts receivable and payable, inventory, and payroll—and then some. Several do more sophisticated tasks, such as job costing and tracking and fixed-assets assessment, and a few help with even tougher tasks. For accounting on a professional scale, look no further.....201

PC TECH

Information Retrieval For Your Intranet.....223

Tools to make corporate data more accessible.

Operating Systems.....231

Automating log-ons to the Internet.

Power Programming.....237

Power MFC programming.

Utilities.....251

Change your keyboard layout.

PC SOLUTIONS

User-to-User.....279

Ask Our Advisors.....291

- Hardware
- Operating Environments
- Word Processing
- Spreadsheets
- Databases

AFTER WORDS

After Hours.....359

Abort, Retry, Fail?.....378

NETWORK EDITION

Follows page 96

Surveying the Wave.....NE1

New Internet-access managers can help control where your employees surf.

- LittleBrother Pro 1.0
- ON Guard Internet Manager 2.5
- SmartFilter 1.0

ALSO IN THIS ISSUE

PC Direct	279
Marketplace	326
Premier	326
Classified	343
BusinessCard	356

- SurfWatch ProServer 1.0
- WebSense 3.0

First Looks.....NE19

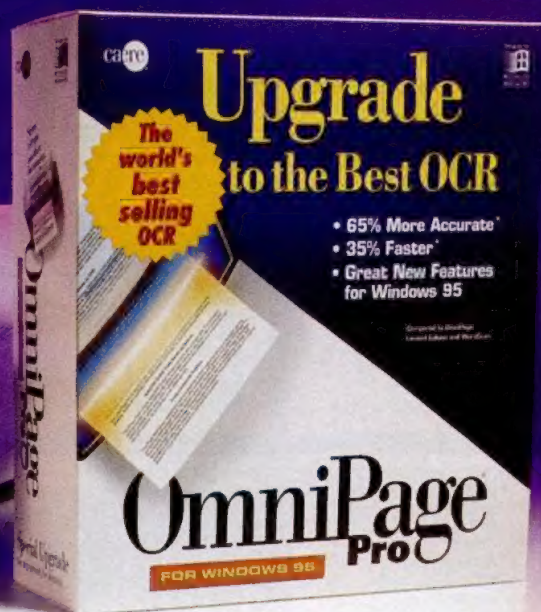
- Diva Pro 2.0
- TigerJet 128K PCI ISDN Modem

Multiple Access.....NE20

- RoM. ROM? No, RoM.

Reader Service Card	365
Advertisers' Index: Companies	373
Advertisers' Index: Products	374
Coming Up	376
Editorial Product Index	377

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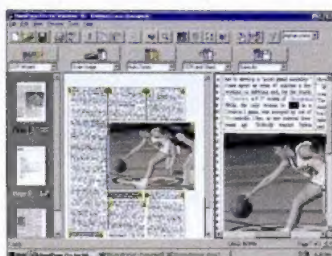
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Pipeline

Can You Spare A Yottabyte?

Just when a gigabyte—or more—is becoming the bare-minimum survival size for hard disks, along comes talk of storage devices that make a gigabyte or even a terabyte seem like chump change. David Weiss, CEO of Storage Technology Corp. (StorageTek), expects to announce partnerships with several Internet service providers in the second half of the year to offer such storage solutions: so-called “I:Drives” (the *I* is for *Internet*). Subscribers would pay \$20 to \$30 a month to rent Internet space in 50MB to 100MB increments.

StorageTek, based in Louisville, CO, is also thinking in petabytes, exabytes, and zettabytes. (To refresh your memory, a terabyte is 1,000 gigabytes; a petabyte is 1,000 terabytes; an exabyte is 1,000 petabytes; a zettabyte is 1,000 exabytes; and a yottabyte is 1,000 zettabytes.) Such massive storage frames has been the domain primarily of mainframes for medical imaging or for certain big businesses, such as banks that digitize and store images of millions of checks.

Weiss, however, foresees some practical home uses of massive storage. With rental space on the Internet, you could, for instance, store digitized home video that would otherwise devour your hard disk. You could access

the video in a snap and show it on your TV or PC. StorageTek is in talks with various partners about such services.

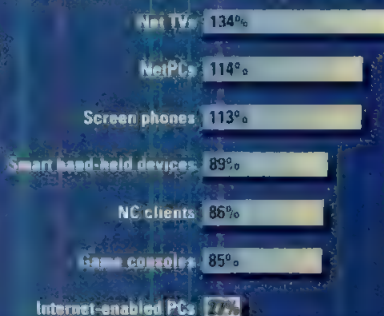
To prepare for the exploding demand for large-scale online storage that Weiss predicts, StorageTek has partnered with Imation (a spin-off of 3M). The two companies plan to develop a next-generation tape drive/cartridge format that, according to Weiss, will take one-third of the cost out of storage and increase capacity by one-third.



The Web Hardware Store

Though worldwide sales of NetPCs and NCs are growing faster than sales of PCs, NetPCs and NCs are expected to capture only 7 to 10 percent of the network computing market by 2001. Internet-enabled PCs will still have the lion's share.

1997 to 2001 compound annual growth rate*



*Projected. The data is for Internet/intranet devices only.

Source: International Data Corp.

Talk About Pushy

Broadcast content on the Internet—dubbed “push” content—is gaining momentum. On the eve of the Spring Internet World conference, Microsoft executive Brad Chase announced support from 30 vendors for the company's new Channel Definition Format (CDF), a technology that's employed in Microsoft's latest Web browser, Internet Explorer 4.0. The data format is designed to allow third parties to “Webcast” information to browsers.

PointCast CEO Chris Hassett was on hand to endorse CDF, as were representatives from AirMedia Live!, BackWeb, and FirstFloor Software.

“We've optimized Internet Explorer 4.0 for push content,” said Chase. “The CDF format is designed to create a standard way to design and Webcast content to Internet Explorer 4.0 users.”

Microsoft has submitted Channel Definition Format to the World Wide Web Consortium for consideration as an Internet standard. But it's not a done deal. Netscape has just announced its Mercury and Apollo software, which will allow the direct delivery of Web content to the desktops of intranet and extranet users. And Netscape's Constellation technology is designed to let users customize the desktop delivery of Web content by means of user interface features, such as rolling tickers of news headlines.

Executive Suites on Wheels

At one time, minivans and Winnebagos were identified solely with big families or retirees. But

in what's shaping up as the latest trend in mobile computing, time-crunched CEOs are turning to souped-up versions of the road warriors to improve productivity on the road. LandJet—the

market's newest offering—comes with a fax, a copier, a printer, a modem, power ports for portable computers, cellular phones, voice mail, a television, a VCR, a CD player, a global-positioning navigation system, and optionally even a shoe polisher and bulletproofing.



Online: ISPs vs. Online Services

Join us online to ponder this important question: Have online services outlived their usefulness? What can America Online, CompuServe, The Microsoft Network, or Prodigy give you that a good Internet service provider can't? See our special report.

ALSO ON THE WEB. Be sure to check in with weekly commentators John C. Dvorak, Michael J. Miller, and Don Willmott for interesting gossip, answers to your questions, and opinions about life on the Internet. And be sure to talk back. Our discussion forums are waiting for your comments.

Pipeline

Spam Be Banned

Junk bonds. Junk food. Junkyards. They're all legal, but soon certain kinds of junk e-mail may not be. Nevada—home of Las Vegas, the nation's most blatantly commercial city—is considering a ban on unsolicited commercial e-mail. Its legislators are hearing arguments as to the legality and feasibility of a bill proposed by a state senator in February. If they pass the bill this session, Nevada will be the first state to ban such correspondence.

According to legislative aides there, Bill 13 addresses complaints from scores of local constituents about the increasing frequency of spamming. As initially proposed, the bill says that "a person shall not send or cause to be sent unsolicited electronic mail to solicit a person



to purchase real property, goods, or services," unless a prior relationship is already established.

Bill 13 will undergo significant changes, say aides. Its language needs to reflect computer-specific issues; it was modeled after a bill restricting unsolicited commercial faxes, which was passed last session. One such proposed amendment—which would let users choose whether to receive unsolicited e-mail—reflects the recent court settlement between America Online and cybermarketer Cyberpromotions. The settlement allows AOL members to choose whether to receive Cyberpromotions' e-mail.

I Need My High-Tech Fix

Computer technology is crossing an important threshold: No longer just a luxury, PCs and online services are poised to become necessities in everyday

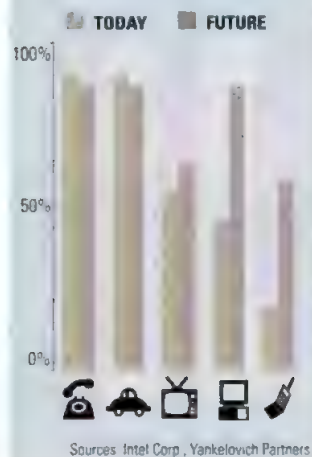
life. According to a recent survey from Intel and Yankelovich Partners, your PC is becoming a "must-have" technology, just like the telephone, the car, and television before it.

Some players are making the same claims about your online service. Robert Pittman, president and CEO of AOL Online Networks, believes your online service or Internet service provider will become as necessary as your refrigerator. Says Pittman, "Consumers are looking to us to do all the work for them."

The embrace of the Internet by the mass market—not just by technology lovers on the fringe—is evidence of this trend, according to Pittman. The reported recent decline in household TV viewing and the rise in PC ownership also point to such mass-market acceptance.

But Daddy, I Need...

Respondents in a nationwide survey say a PC will be a must-have item.



THIS ISSUE'S CONTRIBUTORS: Angela Hickman, Carol Levin, Sebastian Rupley, Don Willmott.

Virtual Business Cards

The Internet is inspiring electronic versions of the ubiquitous business card. A consortium of companies, including IBM and Lotus, is supporting the VCard standard for HTML business cards. And developers of personal information managers are building in support for the cards so that users can exchange them over the Web.

A start-up called iPrint is also getting in on the action, by deeply discounting print services for



such items as business cards on the Web. The company charges \$9.99 for 100 paper cards—which you can design with clip art and fonts at the company's Web site—and tosses in an identical HTML version, including graphics. Companies designing HTML e-mail applications, such as Netscape, foresee a trend toward exchanging HTML business cards within e-mail messages.

Webcasting via Satellite

It's spring, but it's not too early to daydream about the cool computers that will hit the shelves during the holiday season. Hardware and software developers are now working on all the gear needed to deliver the Web at lightning-fast speed over satellites to your PC. Computers labeled as "DSS-equipped"—DSS stands for *digital satellite services*—will download content from the EchoStar or DirectTV satellite services at 30 megabits per second (Mbps), about 300 times as fast as an ISDN line. IBM and Gateway have already announced their intent to ship satellite-capable PCs.

"Satellite is the ultimate in push technology," says Richard Matthews, managing director of the broadband business group at Adaptec, which recently introduced a satellite receiver card for PCs. An electronic programming guide lets you choose the entertainment, news, or software you want. Each of the satellite's 32 transponders can carry up to 5,000 Web sites. And since you don't dial in, there's no "world-wide wait" for Web access.

Matthews expects that satellite companies and Internet service providers will team up to offer subscriptions for about \$25 to \$30 a month.

Top-Selling Retail CD-ROMs

- 1 **Dialo** Blizzard
- 2 **TurboTax Deluxe** Intuit
- 3 **Microsoft Windows 95 Upgrade** Microsoft
- 4 **Quicken Deluxe** Intuit
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- 9 **Microsoft Office Professional 97 Upgrade** Microsoft
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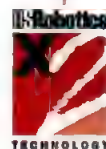
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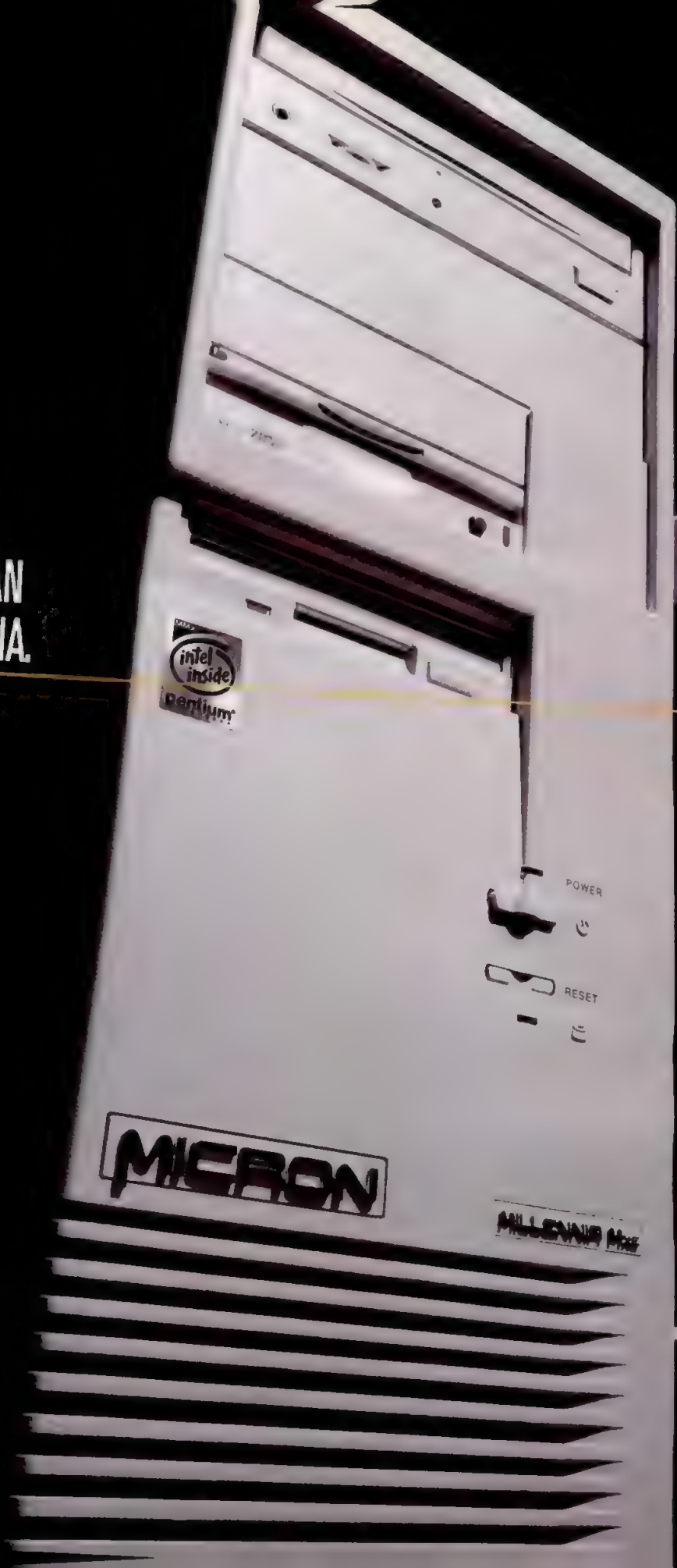
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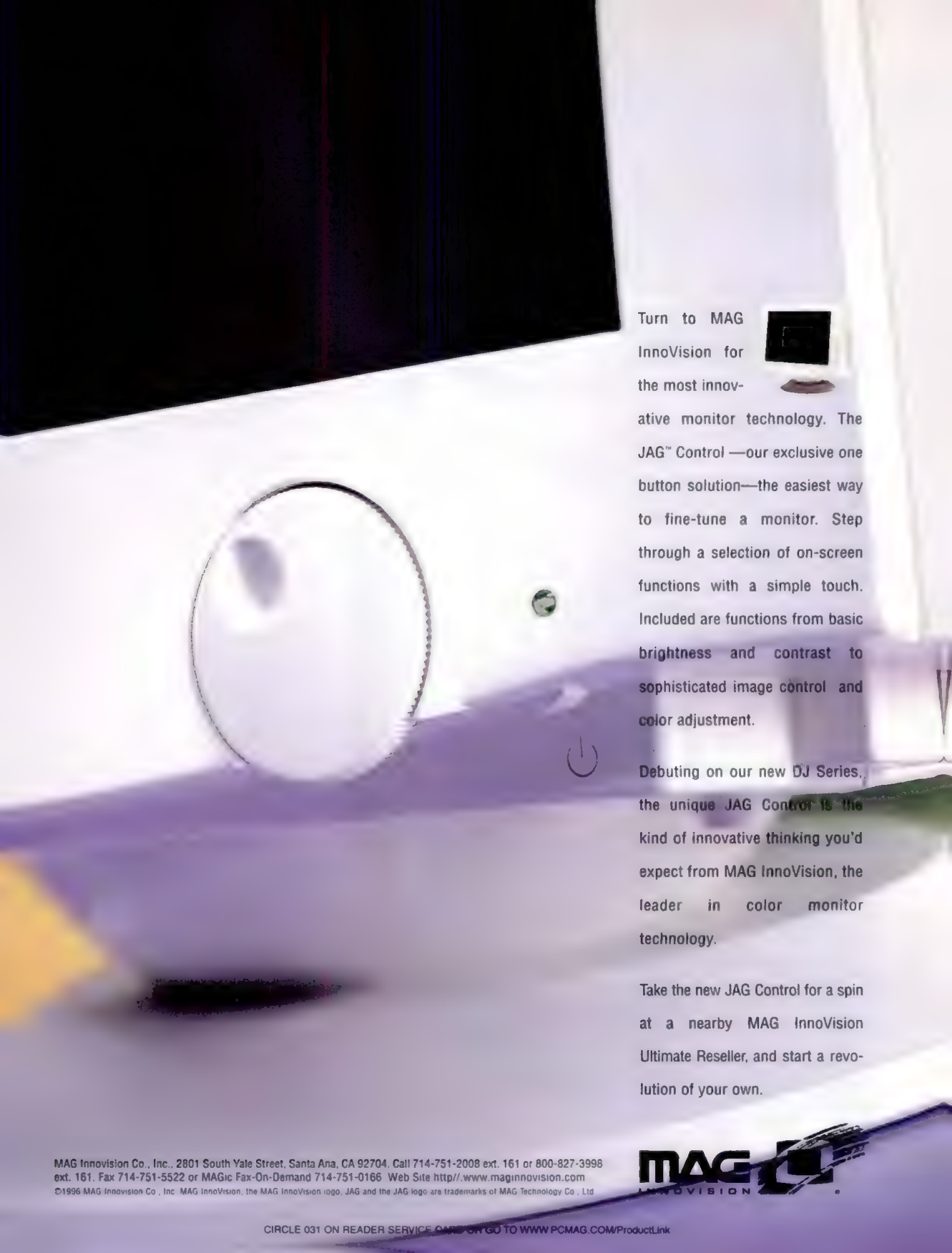
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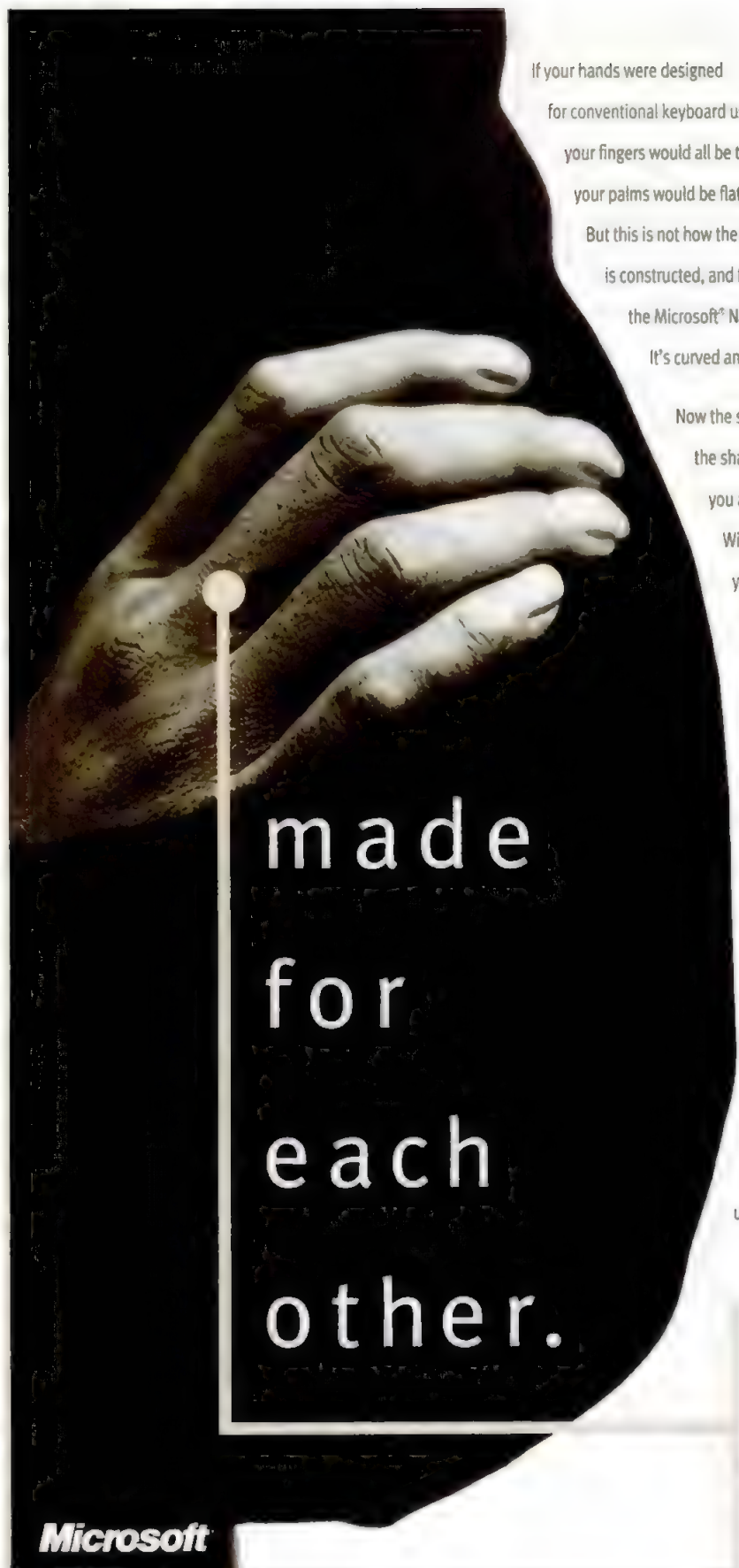
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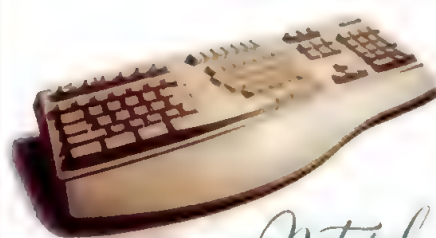
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Letters

DVORAK PREVENTS BREAKDOWNS

Thanks to John C. Dvorak for his column on modem problems ("Communications Breakdown," February 18, 1997). I bought a Cardinal 33.6 MVPLC unit that had the exact same problem, and I was able to fix it the way he suggested. Apparently it's not just U.S. Robotics modems that have this problem.

VIC MENON
via the Internet

I have a Gateway PC with a U.S. Robotics V.34 data/fax modem. Dvorak described the exact problem I've been having since I started using CompuServe. I would never have guessed that my modem was the cause of this problem. Thanks for setting me straight.

BOB PREUSS
via the Internet

I read Dvorak's column "Communications Breakdown" with great interest. I'm somewhat new to the Internet and modems and probably fall into the "clueless" category Dvorak describes. I look forward to more informative articles for us "clueless" types.

LINCOLN BAUMAN
via the Internet

I changed the modem initialization string on my communications programs to add S12=0 and the case was solved. Sherlock Holmes couldn't have done better.

TOM FLICKINGER
via the Internet

Dvorak's tip has easily saved me the cost of my *PC Magazine* subscription (not to mention my sanity). Now I can probably even turn the graphics back on in Netscape Navigator.

DEREK BROUGHTON
St. Thomas, Canada

OS/2 OPEN MIND

Dvorak made an excellent point in his column "Communications Breakdown" when he said that users have come to expect "so-called minor glitches" and that consequently their expectations have come to be lowered. But I have been an OS/2 user for a couple of years, and the longer I use it the more wonderful things I discover. My expectations are being gradually raised, not lowered.

PAVEL OTAVSKY
Woodstock, VT

YOU CAN PLEASE SOME OF THE PEOPLE

Among the "Top 100 Web Sites" described in your February 18, 1997, issue, you describe Microsoft Expedia as "awesome" and end your praise with "It may be time to say bye-bye to your travel agent." It may be true that



*"Dvorak described
the exact same problem
I've been having."*

Expedia does a creditable job of getting the user to a specific city and reserving a Holiday Inn and a Budget car, but do you really believe that this is all a travel agent does?

REX FRITSCHI
Chicago, Illinois

My wife and I loved "Top 100 Web Sites." It gave us no shortage of new ideas to explore.

DAVID M. LAMBERT
Memphis, Tennessee

I really enjoyed your top 100 Web selections but was disappointed that you didn't have an education section, and you included only one art-oriented site.

PIPPIN MICHELLI
via the Internet

I'm glad that modesty did not prevent you from listing ZDNet as one of the top 100 Web sites. This site is invaluable for computing professionals. Whether I need a copy of a piece of shareware or just information, ZDNet is usually the first place I point my browser.

MARK HAMBURG
via the Internet

SEEING IS BELIEVING

Bill Howard says nearly everyone believes that PCs boost productivity ("PCs Are Paying Off," February 18, 1997). This may be so, but many people also believe in UFOs, Bigfoot, and that Elvis is still alive. The real question is not whether people believe that PCs boost productivity but whether PCs actually do. Howard's examples aren't persuasive. PCs

can increase productivity, but for them to do so, we need to focus on software that solves real problems for real users.

JAMES R. MILLER
via the Internet

DEALING WITH THE SUITES

I agree with most of your reasons for choosing Microsoft Office 97 as your Editors' Choice ("Suite Deals," February 18, 1997). However, file size for MS Office applications has grown 20 to 30 percent, and the macro viruses that infect Word documents have proven to be a nightmare to track down and clean up.

ROBERT HARPER
Kensington, Maryland

I consider it inappropriate that *PC Magazine* evaluated office suites when it did. Microsoft had just come out with Office 97, and you compared it with Corel's Office 7, which is more comparable with Office 95.

JOEL HENCKEN
via the Internet

SAME OLD SAME OLD

Your Trends column "Suite Bugs Up Close" in the February 18, 1997, issue hit a bull's-eye. Corel WordPerfect 7.0 has been crashing my Dell Pentium PC equipped with 32MB of RAM when I multitask with other programs. Before that, WordPerfect 6.1 crashed my Packard Bell 486 PC with 16MB of RAM.

MICHAEL WEINER
via the Internet

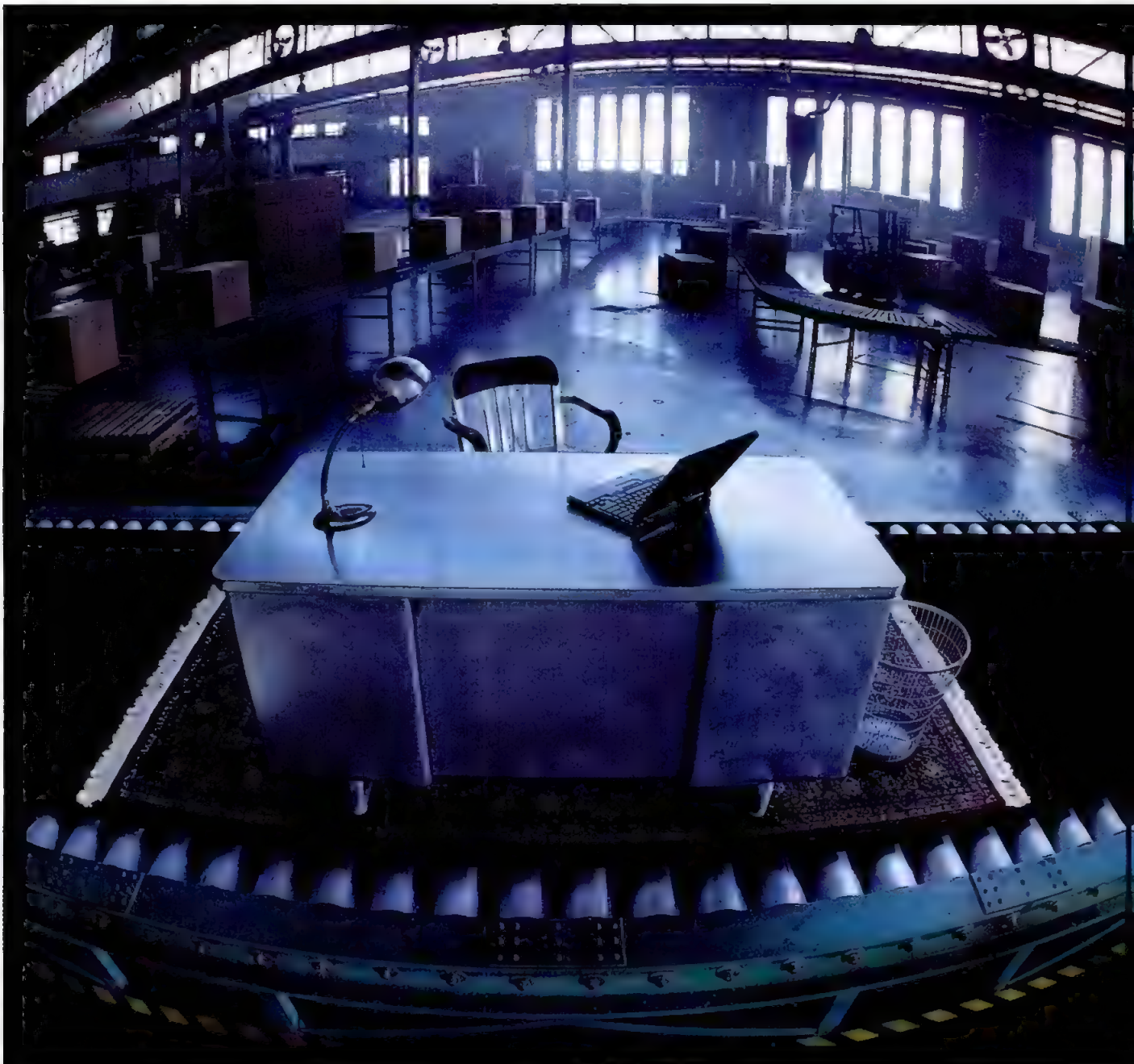
BACK TO ZERO

Year 2000 compliance is a major project that will consume resources in just about every company that uses information technology (Trends, "Waiting for 2000," March 4, 1997). One of the issues facing such organizations is determining which releases of software will cause problems at the start of the 21st century and which are year-2000-compliant. As one of the most widely read magazines about PCs, you could do a tremendous service by publishing a complete list of products that are compliant and by highlighting the updates.

FRED FERNANDEZ
via the Internet

TAX TIME

The article "Taxation Without Frustration" (At Home, February 4, 1997) missed a few points about TurboTax Deluxe. It says the program can "transfer data directly from last year's TurboTax." The program transfers some but not all data. As for the printing control, in the 1995 version one could set printing to "single-sheet," print one side of a form, turn it over, and then print the other



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Letters

side. This doesn't work in the 1996 version. Last, it is a struggle to jump between forms in the new edition, when one line on a form feeds into a line on another form—a routine capability of prior versions of TurboTax.

JON OSTRICKER
via the Internet

TurboTax does transfer data directly from the previous year's version, but only with information that is likely to stay unchanged or be needed for the current year's tax preparation. According to a TurboTax product manager, last year's personal edition did not allow dual-sided printing. And the process of dropping from one field into a supporting form or schedule does not require any more work than in the past. Double-clicking in the field or clicking on the magnifying glass icon opens the navigation window.—Ed.

WARP DICTATION

It was very interesting to read about OS/2 Warp 4's VoiceType features and how well they function ("Talk Back to Your Computer," Operating Systems, February 18, 1997). Having been a longtime OS/2 user who had not upgraded to Warp 4 as of yet, I promptly went out and purchased Warp 4 to try out VoiceType for myself. I found it very capable for navigation and actually pretty good for dictation without requiring extensive training.

B.C. MIELKE
via the Internet

THE MIGHTY PEN

I find it fascinating that the leading PC publication's editor-in-chief, Michael J. Miller, who ends his editorials with a digitized sig-

CORRECTIONS AND AMPLIFICATIONS
In the March 25, 1997, Letters column, we incorrectly stated that "The Netsearcher's Ultimate Cheat Sheet" (December 3, 1996) was available online. To read online reviews of Web search tools, go to www.pcmag.com/lu/srchsite/_open.htm. To learn more about off-line search tools, read the latest InternetUser reviews at www.pcmag.com/lu/browse/search/_search.htm.

In the December 3, 1996, Tutor column "A Look Inside Bitmap Files," we incorrectly stated that the *Encyclopedia of Graphics File Formats* (1996), published by O'Reilly, omitted coverage of the .BMP file format. In fact, .BMP files are documented in the book under the heading "Microsoft Windows Bitmap."

nature, can talk of PDAs ("Taking It with You," January 21, 1997) without even mentioning pen computing. Let's face it, Mark Twain probably wouldn't be using a word processor today.

CHARLIE HAGERMANN
Rockton, Illinois

NEW NEWS DELIVERY

I greatly appreciated your article "Online Content: The Web Delivers" (February 18, 1997). After reading it, I downloaded the PointCast Network. Via Webcasting, I have been able to keep up to date on many things that I didn't have the time for previously, not to mention that PCN is much more entertaining than newspapers.

CHIRAG A. SHAH
Evanston, Illinois

It is surprising that in your article on Web delivery systems, the use of animated advertising on PointCast was not mentioned. I don't begrudge advertising, but I do resent the constant twirling, zooming, and moving ads. These ads are the equivalent of screaming radio commercials being played while you're trying to read.

RICHARD ORTIZ
via the Internet

DELAY EPIDEMIC

There are serious Internet delay problems not only with AOL but also with other online services, including IBM and Sprynet. Each company seems to be having different problems that appear to be internal and not due to any breakdown of the Internet itself. It would be helpful for *PC Magazine* to publish a continuing series quantifying the service problems at the major providers.

MICHAEL SEGAL
via the Internet

SAVE NEWTON

If Apple discontinues the Newton, I will shut down every Mac computer my company uses, throw them all away, and buy PCs. I have been a loyal Mac supporter from the beginning, but this time Apple has gone too far. It just seems as if the company has lost touch with its customers. Once again it has the best product on the market and is just throwing the product away. Maybe Apple

should examine how the Newton is advertised compared with other PDAs.

TODD REINHART
via the Internet

Apple is missing the big picture: Newton technology is the largest step forward in personal information management since the Post-It note. The hints and allegations that Apple is no longer supporting the Newton are very disconcerting. With the release of Windows CE, everyone is chanting the end of the Newton. Windows CE is simply a copy of Windows 95, which is just a copy of Macintosh OS. Unlike the Newton, no CE machines were designed for mobile computing from the ground up. I hope that the management at Apple, the computer industry in general, and the press will make sure that all sides of the Newton issue are explored before a premature decision is made by the bean counters.

BRYAN WEINSTEIN
via the Internet

DOS TESTIMONY

In his February 4, 1997, "Inside Track" column, John C. Dvorak repeats a rumor that the original MS-DOS contained code that was copied from CP/M. I wrote 86-DOS, the predecessor to MS-DOS, long before Digital Research had a version of CP/M for the 8086 processor family.

One of my design goals was that the 86-DOS application programming interface would match CP/M's API as closely as possible. But CP/M's binary code consisted of machine instructions for the 8-bit 8080 microprocessor; these were completely different from the instructions for the 8086. It would be impossible to "lift" any 8080 code from CP/M and use it in an 8086 program such as 86-DOS, which was written entirely in 8086 assembly language. In addition, the on-disk storage format of 86-DOS (a file directory with a separate file allocation table) was completely different from CP/M's multiple directory "extents" of 16K each. The vast majority of the core code of 86-DOS was providing access to and managing this data format (FAT-12), and there was no code in CP/M that could in any way help it do that.

TIM PATERSON
Microsoft Corp.

HOW TO CONTACT US

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Trends

It's a Fake!

Software pirates, beware.

Over the last 15 years, the computer industry has fought to put software counterfeiters out of business for good, but the search for a technical solution to this widespread problem has been unsuccessful so far. On the streets of Hong Kong, you can easily pick up a set of four CD-ROMs packed with popular applications for around \$40. The same applications carry a retail value of around \$12,000. Despite the efforts of industry watchdogs to enforce anti-piracy laws, there is no foolproof technology for stopping counterfeiters from mass-producing applications or any other kind of content stored on an optical disk.

One answer may come from Israeli company TTR, which recently completed development of a digital-fingerprinting technology, DiscGuard. The process calls for etching a digital fingerprint into the pits and lands of optical disks, including CD-ROMs and DVDs. The fingerprint—or signature—cannot be copied onto another disk, but it can be read in order to verify a disk's authenticity. By preventing CD-to-CD replication, it could deal a heavy blow to large-scale counterfeiters.

But DiscGuard is not designed to prevent other popular and illegal forms of piracy, such as buying one copy of an application and installing it on multiple machines. "DiscGuard is intended to combat counterfeiting and CD-R 'burning,' but not multiple installations from an authentic CD," explains Baruch Sollish, chief scientist at TTR,



which is north of Tel Aviv. "DiscGuard does not physically prevent the copying of an NR/CD," he adds. NR/CD stands for *non-reproducible CD*, TTR's name for the fingerprinted disks.

To produce an NR/CD, a disk replicator needs a special hardware attachment for the mastering machine, an authorization "key" that TTR provides for every master, and a developer-supplied software key produced

with a TTR utility. During the optical process of mastering the disk, the hardware etches a fingerprint, or pattern, on the glass disk without damaging or altering its contents. TTR provides developers with a utility that verifies the CD's fingerprint. If a fingerprint is not present or is invalid, the user is presented with one of several situations, none of them satisfying: Each of the disk's applications could run a demo version, display an order form, or lecture the user on the importance of buying only legitimate software. In the long run, such outcomes could discourage purchases of disks that, because of their low prices, are obviously counterfeit.

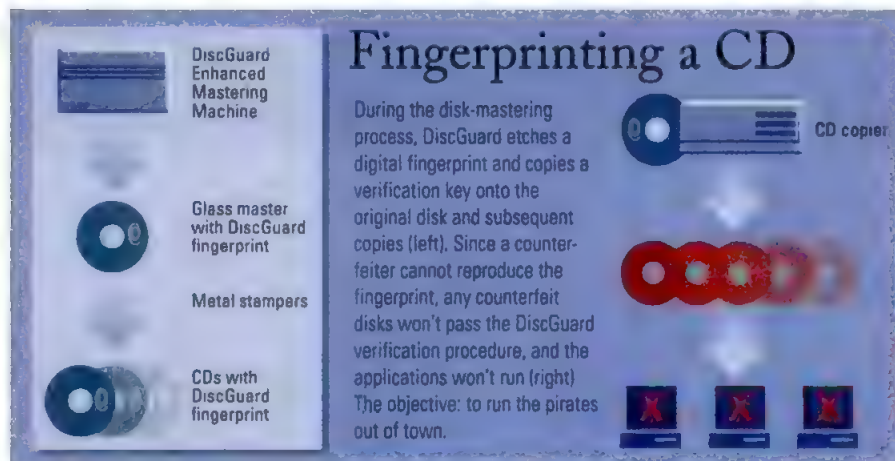
TTR has filed for a patent and is courting disk manufacturers and software developers in an effort to license DiscGuard.

ETHICAL LAPSE

Software companies' financial losses due to piracy are astounding. "Global software piracy losses—more than \$13 billion—exceed the combined revenues of the 13 largest software companies," says Robert Holleyman, president of the Business Software Alliance. According to the BSA, Eastern Europe has the highest piracy rate, with an average of 83 percent of all installed software. North America has the lowest rate, with an average of 27 percent.

Although TTR's technology sounds promising, the market is unforgiving. Bob Kruger, vice president of enforcement for the Business Software Alliance, sounds a cautionary note. "The industry has wrestled with this problem now for 15 years or more. Here we are in 1997, and people are still coming out with different systems they hope will be the silver bullet."

He's also skeptical of a one-size-fits-all solution. "Pirates have always found a detour around every roadblock we've placed in their way. The reason is that piracy itself is a lapse in ethics," he says. "There will never be a foolproof solution to what is at bottom an ethical problem." —Carol Levin



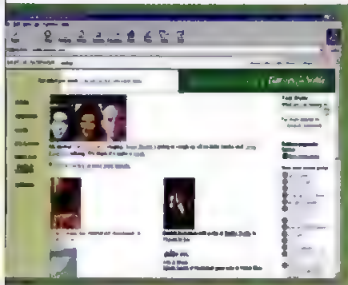
Web City Guides

Tapping the Web for local listings.

Now that you're working longer hours, aided by all your productivity software, Microsoft wants to help you make the most of your precious free time. The company makes no secret of its intention: It wants the Web to become a fundamental part of your life outside the office.

But so far, "the majority of people have been able to resist the Internet," says Pete Higgins, group vice president of Microsoft's interactive-media division. In fact, only one in ten households takes advantage of it, he says. Why? Because the Internet is simply not necessary. "There's a dearth of truly useful products," Higgins comments. "To make the Internet live up to its potential, we need to help people do more with limited time and resources."

According to Higgins, the key drivers of the Internet will be financial services, online games,



ABOUT TOWN: Web advertisements on sites such as Microsoft's new city guide *Seattle Sidewalk* are moving beyond technology brands.

and local information. Microsoft expects to have its Sidewalk guides for ten cities—including Seattle, New York, San Francisco, and Washington, D.C.—ready by the end of the year. You can tell Sidewalk what type of movie, music, and food you like and it'll present you with custom picks and "Editors' Choices." But Microsoft isn't the first one to tap into the local scene. CitySearch, for instance, already offers extensive, up-to-date guides to several cities in the United States. And the Web editions of some newspapers, such as *The Washington Post*, also offer guides to local entertainment.

Higgins points out that the city guides offer opportunities for Web advertising to move beyond technology brands. So far, Sidewalk's national advertising sponsors include Bank of America, Barnes & Noble, BMW, Citibank, Club Med, Prudential Real Estate, Seafirst Bank, United Airlines, and Visa.

But plenty of questions remain about how Microsoft can make money with its online ventures, Higgins says. The company is testing all the waters for revenues: subscriptions, transactions, sponsorships, and advertising. Higgins suggests, "No one model will be dominant. The key is to be flexible." Microsoft's success formula, he adds, combines software technology, partners, and content.—Carol Levin



A Day with the Online Services

TESTING AN ONLINE SERVICE IS MUCH LIKE eating from Forrest Gump's box of chocolates: You never know what you're going to get. We know from our own use of online services that no two days are alike and that our experience often varies throughout the day.

To see just how much hour-to-hour difference you might expect, we followed America Online, CSi (formerly CompuServe), The Microsoft Network, and Prodigy through one day's highs and lows. We tested in conjunction with "Online Services: Is It Time to Jump?" in this issue. Although these results represent only a single day, they do illustrate the variability we found among the services.

We found that during the course of any day, you'll experience problems endemic both to online services and to the Internet in general: busy signals, dropped lines, poor connect speeds, and data-transfer delays. And though modem and error-correction technology has improved many times over, problems still remain.

YOUR SPEED MAY VARY

Using Micron Millennia P133 PCs and U.S. Robotics Sportster 28.8 modems to connect to the four services, we looked at the time spent to accomplish four activities: connecting to the service, checking e-mail, completing a download from a proprietary library, and completing a download from a common FTP site. Additionally, we noted the modem speeds that the services reported for our connections. We ran the tests

simultaneously every half hour, from 10:00 A.M. to 8:00 P.M. eastern time.

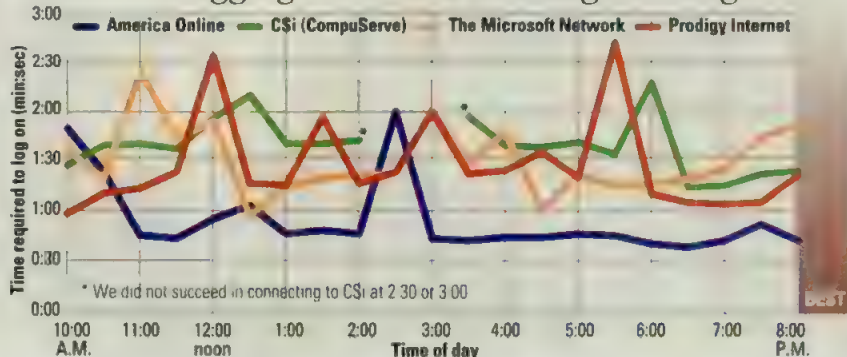
In the course of testing, we found that modem speed did not correspond with connect time. Each service exhibited connect and log-on times that varied widely in relation to the modem speed that was reported. For example, we needed about 1 minute to log on to Prodigy at 10:00 A.M. and 2 minutes 34 seconds at noon, even though the service reported both times that our modem connected at 28.8 kilobits per second (Kbps).

Our e-mail test, which measured the time it took to invoke the full display of the mail client, yielded a wide range of times between the services, from an almost instantaneous "no mail" response on AOL to a painful 2-minute wait on MSN. We might have expected this: AOL prechecks e-mail at log-on, so getting to the client is naturally fast.

For the file download test, we measured the time needed to download a copy of PKZIP 2.04g from each service's proprietary library (using the native protocol) and from a common FTP site (using standard FTP protocol). For the day we tested, the overall speed winner for this test was Prodigy—probably a result of the service's consistently fast connect speeds. Predictably, AOL's connection rates produced poor download speeds. And MSN bucked the trend by posting faster file-transfer rates from the external FTP site than from its native libraries.

In most cases, we could remedy dropped signals and bad connections by simply trying again.—Jay Munro

Logging On: What's Taking So Long?



Trends

Rock Concerts and PC Theaters

Intel is psyched about hybrid applications for entertainment and business.

Intel is getting ready to stage a rock concert on your PC. As part of its Hybrid Application Initiative, which CEO Andy Grove introduced last summer, the company has opened up the resources at the Intel Architecture Labs in Oregon to developers of multimedia applications. The resulting programs combine hard disk—or CD-ROM—based video and audio with live multimedia Web content, and they're just starting to show up.

JAM TV Music Networks has demonstrated streaming video of a rock concert over the Web combined with audio and video on a CD-ROM. And Wells Fargo produces an online banking application that combines Web-based account data with CD-ROM-based video clips explaining the bank's statements. "New Internet users invariably lament that the Web means a lot of pointing and waiting," says Intel executive vice president Frank Gill. "Bandwidth improvements move slowly, so we must maxi-

mize local multimedia capabilities to bring rich media to Internet users."

Intel's Interactive PC Theater systems, designed for family rooms, will show up later this year. These multimedia systems will have extra-large monitors, Web access, rich media, and wireless peripherals that work from all around a room.

Intel has also formed the Networked Multimedia Connection—a partnership with Cisco Systems and Microsoft—which promotes the development of networked multimedia applications combining broadcast information, desktop audio, and videoconferencing, particularly for corporate intranets. The three companies have agreed to provide technical support to developers of such applications, as well as to network management personnel deploying them. They also recently opened the Networked Multimedia Lab, located at Cisco headquarters in San Jose, which is dedicated to the effort.—*Sebastian Rupley*



JAKE KIRCHNER

Web Commerce: It's a Personal Matter

After a couple years of technological hemming and hawing, Web-based commerce is finally starting to take off. I know that e-commerce is hitting its stride because in just the past few months, most of the Web users I know have taken the plunge and made some transaction across the Net.

Of course, there are other signs. For one, Dell Computer is taking in a million dollars a day selling computers and accessories from its Web site. Computer buyers are more likely to be at the head of this parade, but it's also true that more consumers are getting into the electronic swing of things as well. Thousands of folks are buying books from Amazon.com, CDs from CDnow, and airline tickets from Expedia.

And why not? Buying things via the Web is just as easy as buying from catalogs or mail-order ads. And the technology that makes it possible also makes it enjoyable. For example, the community-of-interests-and-preferences concept pioneered by Firefly has been a fascinating development—and fun to take part in.

Of course, anything based on computers and telecommunications has drawbacks. For instance, Firefly keeps suggesting I check out the latest Blues Traveler CD. Sure, I could tell Firefly there's no way I'll ever buy a Blues Traveler CD, but I'm enjoying feeding it other preferences to see how long the system takes to figure out I'm not a Blues Traveler kind of guy.

The biggest thing missing, however, is personal service. You can "personalize" an online service, but that just means you're telling the service or site what you want it to give you back. What



I'm talking about, rather, is the kind of service for which Nordstrom's is famous, the kind of service I get from the "tie lady."

The tie lady works behind the tie counter at a local men's store. I might buy just about any other article of clothing from a catalog or Web site, but whenever I need a new tie, I go visit the tie lady. Somehow she always remembers that I wear single-color shirts, not stripes (preferring button-down but not Oxford cloth), that I like bold but not garish ties, and that I am fighting a lifelong addiction to paisleys. Somehow she can unerringly and without hesitation pull out three ties that are dead-on perfect for any suit or jacket I have in hand. Okay, so they're always the most expensive ties in the store; who wouldn't pay for service like that? More to the point, what Web site can match it?

I won't be satisfied with Web commerce until the technology makes this kind of service possible. I envision surfing over to my favorite CD site, where the "CD guy" pops up on my desktop videoconferencing system to greet me: "Hey, Jake, my man. Long time, guy. Am I glad you dropped in! I've been holding a copy of a re-issue of an impossible-to-get Isabel disk of that awesome acoustic set Buddy Guy and Junior Wells recorded in Paris. I know you'll like it. It's in your basket already."

The CD guy now works at my local music store. Why can't he work on the Web? And why can't the tie lady? And how about my travel agent, who already knows not to pitch me ski vacations or dude-ranch getaways? Why can't they all be on the Web?

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Takin' Care of Business

If you're gearing up to buy new PCs for your business, there's more to consider than you might think. Unlike last fall, when the hottest segment of the PC business was the home market, this spring the focus is shifting to corporate PCs.

Along with Compaq and Hewlett-Packard—two market leaders who are beefing up their current business offerings—both Micron Electronics and Toshiba America Information Systems, a newcomer to the business-PC game, have new entries to the corporate desktop arena.

Toshiba (800-457-7777, www.computers.toshiba.com) made an impressive entry into the home PC market with its line of Infinia PCs. With its new **Equium** line—which targets enterprises from small businesses to Fortune 1000 companies—the company is now hoping for similar success in the commercial desktop arena.

In an attempt to reduce total cost of ownership, the Equium line offers easy serviceability and support for the Desktop Management Interface 2.0. Systems also include Intel Corp.'s LANDesk Client Manager 3.0, integrated thermal sensors to monitor system status and resources, and a Kensington lock for security. Equium systems are also network-ready: Each features an integrated auto-sensing 10/100-Mbps Fast Ethernet adapter, Intel's EtherExpress PRO/100B.

There are three different desktop models and one mini-tower model in the line; all carry a three-year limited warranty with one year of on-site service. The low-end Desktop 5160D (\$1,900 street) is powered by a 166-MHz Pentium MMX CPU and includes

32MB of EDO DRAM, a 2.1GB hard disk, and a 12X CD-ROM drive. Stepping up to the \$2,100 (street) Desktop 5200D buys you a 200-MHz Pentium MMX CPU and a 2.4GB hard disk. Both models include a dual-install operating-system option of either Microsoft Windows 95 or Windows for Workgroups 3.11.

At the top of the Equium line are two 200-MHz Pentium Pro-based PCs: The Desktop 6200D and the Mini-Tower 6200M (street prices, \$2,500 and \$3,500, respec-



tively). Both come preloaded with Windows NT Workstation 4.0. The Desktop 6200D features 32MB of EDO RAM, a 3GB hard disk, and a 12X CD-ROM drive. The mini-tower 6200M adds support for a second Pentium Pro CPU, RAM expansion up to 512MB (the Desktop 6200D maxes out at 128MB), and a 4.2GB Ultra Wide SCSI hard disk.

Micron (888-634-8799, www.micronpc.com) has added three new classes of systems to its **ClientPro** line: The entry-level ClientPro Mta PCs, the slightly more advanced Mte units, and (for high-end users) the Xvi systems. All these computers are network-ready: Each features a 3Com 3C509 Ethernet card (Token-Ring and Fast Ethernet cards are

also available), DMI support, and (to monitor the system over the network) Intel's LANDesk Client Manager 3.0.

These ClientPro units come standard with 16MB of EDO RAM, a self-monitoring 1.2GB EIDE hard disk, an integrated 64-bit S3 ViRGE graphics accelerator with 2MB of EDO RAM, and a 15-inch monitor. Both the Mte and Mta systems also come with Windows 95; Windows NT 4.0 is an option.



CORPORATE WONDERS: New systems from Micron (above) and Toshiba (left).

Mta models with a 133-MHz Pentium CPU and 512K of L2 cache start at \$1,599. Mte systems offer most

of the same features as the Mta's but add processors with Intel's MMX Technology; prices start at \$1,799 for units with 166-MHz Pentium MMX CPUs and 512K of external cache. ClientPro Xvi PCs feature a 180-MHz Pentium Pro processor (200-MHz CPUs will soon become standard) with 256K of integrated external cache, a 12X CD-ROM drive, and Windows NT 4.0. Prices start at \$1,999.

Market leader Compaq (800-345-1518, www.compaq.com) recently announced two new **Deskpro 6000** PCs targeted at high-end networked installations. The Model 5166X/2150/PDS (\$3,110 street) features a 166-MHz MMX chip; the Model 5200X/4200/PDS (\$3,960 street) incorporates a 200-MHz MMX CPU.

Each base-model mini-tower system comes standard with 32MB of EDO RAM (expandable to 256MB), a Smart Ultra SCSI hard disk (various sizes are available), 512K of external cache, an integrated Compaq NetFlex-3—a 10-Mbps Ethernet adapter (upgradable to 100Base-TX)—and Matrox MGA Millennium graphics cards with 2MB of WRAM. The units also come with Windows NT 4.0 and feature support for Compaq's Intelligent Manageability, so administrators can track system assets over the network. Also standard are 6X PD-CD drives, which can read existing CDs at 6X speeds and provide 650MB of rewritable storage.

Hewlett-Packard (800-322-4772, www.hp.com) is offering value PCs for businesses, with its new entry-level **Vectra 500** series, with prices starting as low as \$1,110 (street). Intended for basic computing needs, the base configuration of these

units consists of a 133-MHz Pentium processor, 16MB of RAM, and a 1.2GB hard disk. This rudimentary configuration doesn't include a CD-ROM drive, sound card, or modem.

In its more full-featured **Vectra 500 Advanced Business Communications** series, HP has added USB support to its new MMX-equipped models. These systems come with 2.5GB hard disks, 16-bit sound, 28.8-Kbps modems, and 16X CD-ROM drives, plus Microsoft Word and Publisher. The 166-MHz Pentium MMX version starts at \$1,950 (street) with 24MB of RAM, and the 200-MHz Pentium MMX system includes 32MB of RAM for \$2,570 (street); neither price includes a monitor.

Later in the second quarter of this year, the business PC market will also welcome a new player, Gateway 2000.—Anush Yeghazarian

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DMI 2.0

Security features: chassis intrusion
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configurations also available



COMPUTER-AIDED DESIGN

Dimensional Designs

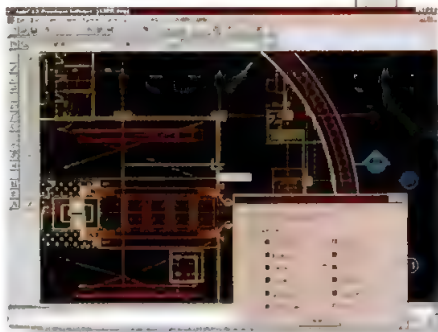
The latest releases of 2-D drafting and 3-D modeling CAD packages are providing greater sophistication to satisfy all levels of professional technical drawing needs.

ViaGrafix's \$499.95 **DesignCAD 97** targets both professionals and novices (800-233-3223, www.via-grafix.com). CAD beginners have an edge, thanks to such new features as a 3-D walk-through, 2-D drafting tools with over 200 drawing and editing commands, and 3-D solid-modeling tools with Boolean operations and volume calculation. DesignCAD 97 also adds advanced tools for creating complex surfaces, animation with .AVI support, anti-aliased rendering, True 3D texture mapping, and direct scanner support with vector conversion. You can output files to VRML for use on the Internet.

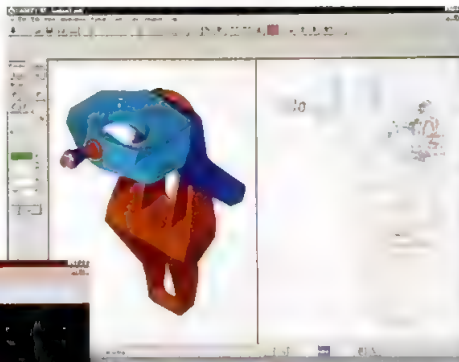
Due by early summer is Autodesk's **AutoCAD Release 14** (price to be announced; 800-964-6432, www.autodesk.com). Many features of Autodesk's Internet Publishing Kit have found their way into this release of AutoCAD, providing a suite of quick-start tools for publishing, sharing, and accessing information on the Web.

This Internet-friendly version of CAD also has ActiveX automation tools.

This version of AutoCAD features improved speed, thanks to a new graphics pipeline that decreases the memory consumed when loading files. There's also photorealistic rendering capabilities, display ordering, and a host of new reference-file capabilities,



third-party developers. TurboCAD embellishes numerous features to such functions as handle-based editing, viewing, layering, and CAD editing. Other new tools include a step-by-step setup of the drawing en-



DRAWING SPECIALISTS: AutoCAD (left) and Baystate's Cadkey (above).

vironment and raster-to-vector algorithms that let you quickly vectorize images

from any scanner and bitmap files (up to 11 by 17 inches) directly into TurboCAD. A VRML output filter will be available as a free download over the Web.

For a high-end, industrial-strength approach to 2-D and 3-D CAD, take a look at **Cadkey 97** from Baystate Technologies

(800-372-3872, www.cadkey.com). The \$1,195 product introduces hybrid modeling capabilities (wireframe, surface, and solid), OLE 2.0 container support, and extensive bi-directional 3-D data translators for stereolithography output and downstream manufacturing. Cadkey 97 offers VRML output for collaborating or displaying 3-D designs on the World Wide Web.

Early this summer, Corel Corp. will offer its 3-D modeling package, the **CorelCAD 2** (price to be announced), bundled with Corel's drafting

tool, **CorelVisualCadd3** (800-772-6735, www.corel.com). Targeting design professionals, CorelCAD 2 adds a system of working planes that simplifies the creation of features on a model. It also features the ability to lock certain attributes of a profile, a visualization mode that lets you work directly on a rendered version of the model, a step-by-step history of the models' design, and a host of new options for the solid editing of models.—Yvonne Koulouthros

UTILITIES

Keeping the Pace

No sooner had we finished our annual blockbuster utility guide (April 8, 1997) than new versions of antivirus packages were already being introduced. A major impetus for the speedy turnaround was the release of Microsoft Office 97, which uses new file formats and a new common macro-scripting language, thus leaving your system susceptible to a new breed of macro viruses.

McAfee Associates' just-released **VirusScan 3.0 for Windows 95** (\$50 street) continues

McAfee's tradition of innovation (800-332-9966, www.mcafee.com). It offers protection against Office 97 macro viruses as well as a revamped detection-and-scanning engine and SecureCast, an update service that's based on BackWeb's push technology. You can get free signature-file updates of VirusScan for the life of the product, and Version 3.0 comes with a year of program upgrades.

Thanks to the LiveUpdate feature, Symantec Corp. (800-441-7234, www.symantec.com) has made Office 97 virus protection a no-brainer for users of the \$69.95 **Norton AntiVirus 2.0 for Windows 95**. When you download the monthly virus-definition files, Symantec automatically upgrades the detec-

tion engine to provide virus protection for Office 97. Version 2.0 includes free updates for the life of the product.

Dr Solomon's Software (888-377-6566, www.dr-solomon.com) has announced that Version 7.69

of its **Dr Solomon's Anti-Virus Toolkit** (\$80 street) will include comprehensive protection from Office 97 macro viruses,

NetGuard technology for guarding against viruses spread on the Internet, and enhanced heuristics for catching unknown viruses. Toolkit, which is targeted at the corporate market, comes with a year's worth of quarterly update disks. **Dr Solomon's Anti-Virus** (\$50

street) provides the same virus protection and technology found in Anti-Virus Toolkit, but its interface is slightly more accessible to the home user; it's targeted at small businesses and home users. Monthly online updates will cost

you an additional \$29.95 a year.

One of the standouts on our antivirus tests, **PC-cillin II** (\$50 street) is also meeting the Office 97

challenge. Touchstone Software Corp. (800-531-0450, www.check-it.com) plans on posting a free download on their Web site for updating PC-cillin's virus-definition files as well as a .DLL that helps fortify your system against Office 97 macro viruses.—John Morris

RECAP

PC Magazine reviewed antivirus utilities in the issue of April 8, 1997; Symantec's Norton AntiVirus 2.0 for Windows 95 was awarded an Editors' Choice.

Trends Peripherals

CD-R DUPLICATORS

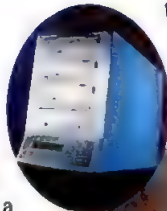
One-Button Copier

Since most desktop systems are equipped with CD-ROM drives capable of reading up to 650MB of data, it's no wonder that many organizations are using copies of CD-ROMs to distribute everything from databases to graphics files. Ideally, such copies would be created in-house for quick and easy distribution using a CD-R drive connected to a PC. But even though CD-R is accessible, it still requires that the user have a solid understanding of the mastering software and the time to oversee the process. And a single CD-R drive just won't cut it if you need a dozen copies of one CD-ROM or two copies each of three different CD-ROMs.

Enter a new breed of stand-alone devices: CD

copiers. Priced in the \$3,000 to \$8,000 range, CD copiers let anyone in the office make a copy (referred to sometimes as a "glass master") of an existing CD-ROM or audio CD at 4X speed in about 18 minutes. The first vendors to offer these units are MediaForm (800-220-1215, www.mediaform.com) and Microboards Technology (800-646-8881, www.microboards.com).

MediaForm's \$3,590 **CD2CD** and Microboards Technology's \$2,995 **CD Blaster II** use a Yamaha 4X recorder and a Plextor 12X reader. In addition, they require no PC



CD COPIERS: MediaForm's CD-2500 Autoloader and CD2CD (inset).



hookup or hard disk.

The 22-pound CD2CD has three bays that can house up to three 4X recorders and a 12X reader (\$6,390 street). Another approach is to add the **CD-2500 Autoloader** (\$3,995 street) to an existing 2X or 4X authoring system to facilitate the unattended duplication of as many as 25 CDs at a time.

The new **CD Blaster II** (\$7,995 street) from Microboards is tower-shaped and has four bays that can house up to four 4X recorders with the reader connected externally. The price includes an optional 1GB SCSI hard disk that installs in the device for buffering and for storing data to copy onto a CD-ROM later on. —Toni Kistner

RECAP

We tested fifteen CD-R drives in our issue of February 4, 1997. Sony's Spresra CSP-9411S came away with our Editors' Choice award.

CD-ROM DRIVE

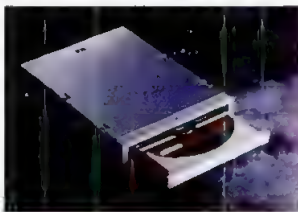
Spinning Strong at 16X

DVD may be just around the corner, but CD-ROM drives continue to make technological advances that ensure their role as a staple PC peripheral for the foreseeable future. LG Electronics USA (800-243-0000, www.lgeus.com), Mitsumi Electronics Corp. (800-648-7864, www.mitsumi.com), and Wearnes Peripherals International (408-432-1888) are all introducing ultrafast 16X CD-ROM drives.

To achieve a maximum 16X rotational speed (rather than speeds that fluctuate between 12X and 16X), these drives implement a combination of constant linear velocity (CLV) and

constant angular velocity (CAV) rotation methods. CLV rotates the disk at varying speeds, depending on whether the laser is reading from an inner or outer track; CAV rotates the entire disk surface at a constant rate. Manufacturers claim this approach produces less vibration, lowers power consumption, and yields quicker access times.

LG Electronics' Goldstar models—the external tray-based **CRUD-8160B** (\$200 street) and the external slot-loading **CRUD-8161B** (\$230 street)—claim a throughput of 2.4 MBps, an access time of 100 ms, and a 128K memory buffer. Both



A NEW SPIN: Mitsumi's 16X CD-ROM drive.

models can be mounted horizontally or vertically; the 8160B has a motorized soft-eject front-loading tray, while the 8161B lets you insert the CD directly into the drive mechanism, getting rid of the need for a disk caddy or tray.

An internal EIDE unit that can also be mounted horizontally or vertically, the **\$250 Mitsumi 16X CD-ROM drive** uses both CLV and CAV modes to achieve a throughput of between 1.8- and 2.4-MBps, an average access time of 120 ms, and a 256K buffer.

The Wearnes **CDD-1620** (\$148 street) is also an internal EIDE drive that uses CLV and CAV modes to achieve a maximum throughput of 2.4 MBps, an average access time of 130 ms, and a 128K memory buffer. —TK

RECAP

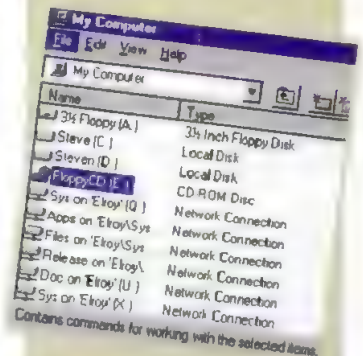
PC Magazine tested six 10X and 12X CD-ROM drives in our issue of January 21, 1997. Plextor's 12PleX line garnered an Editors' Choice.

CD-R SOFTWARE

By the Packet

Creating CD-ROMs is about to get a whole lot easier, thanks to the advent of variable-packet-writing technology. Rather than making you write a CD-ROM in a single session, this method lets you write a packet, or a portion of files, at one sitting and then write additional files to the same disk in future sessions.

Smart Storage (888-479-0100, www.smartstorage.com) is first on the block with its variable-packet-writing software, **FloppyCD**. To copy files, simply use Windows Explorer to drag and drop them onto the CD-R drive—just as you would with a floppy disk. You can also make password-protectable CD-ROMs specifically for backup purposes and ISO 9660 disks that can be read on any CD-ROM reader. FloppyCD lets you take a "snapshot" of the disk's contents at any point during the creation process.



Right now, the only drive maker to support variable packet writing is JVC, which has included FloppyCD in the Archiver Plus CD-R drive package (\$400 street) under the name CD-R Extensions. Adaptec, a leader in premastering software, is expected to release its packet-writing software, DirectCD, by the summer, at which time we expect the bulk of CD-R drive manufacturers to announce drives that support it. —TK

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- ★ **2 Universal Serial Bus (USB) Ports**
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— PC WORLD, December, 1996 —

NOW WITH MMX TECHNOLOGY. Buy a Dell computer,

and according to the latest *PC World* subscriber survey, you'll have fewer problems with it than you will with virtually any other major brand. And in the rare event you do have a problem, these readers went on to add that you still won't have a problem. Because you'll experience one of the shortest times to reach a support person, one of the swiftest resolutions of your problem and one of the highest customer satisfaction rates in the industry. By the way, this year's survey saw service and support dwindling away, with most other major computer makers being downgraded. Which should tell you something loud and clear about the competition. Apparently, the only way they know how to cut costs is to cut corners.

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CHAT SERVERS

Adding Pizzazz to Chat

User participation online is gradually making its way into the mainstream of Web technology, luring businesses into an age of interactivity. As these snazzy new chat room packages demonstrate, the more this technology advances, the more practical it becomes for business users to discuss their company's future.

eShare Expressions Chat Server Suite, from eShare (888-374-2734, www.eshare.com), aims to compete against the market leader, iChat, in the corporate arena by touting its ease of use in setting up and managing chat rooms. Expressions allows you to set up a password-protected room, give it

a name, and configure it for a moderator and a speaker—all in less than a minute. The Java-based package works behind firewalls and requires no client downloads. The software costs \$795 for a 50-user license and \$3,500 for a 1,000-user license.

E-Pub Chat, from E-Pub (212-230-2320, www.e-pub.com), is a Java software package that aims to create lively online discussions in the style of the graphical chat site The Palace (TrendsInternet, February 4,

1997). E-Pub Chat has a flexible design that lets you create a chat room by inserting backgrounds and clip art produced in any art software you choose. Version 2.0, scheduled for release in June, will also allow you to import image sequences.

To see E-Pub Chat in action, take a look at the interactive game Cosmo's Conundrum, which is accessible from the company's Web site. Also avail-

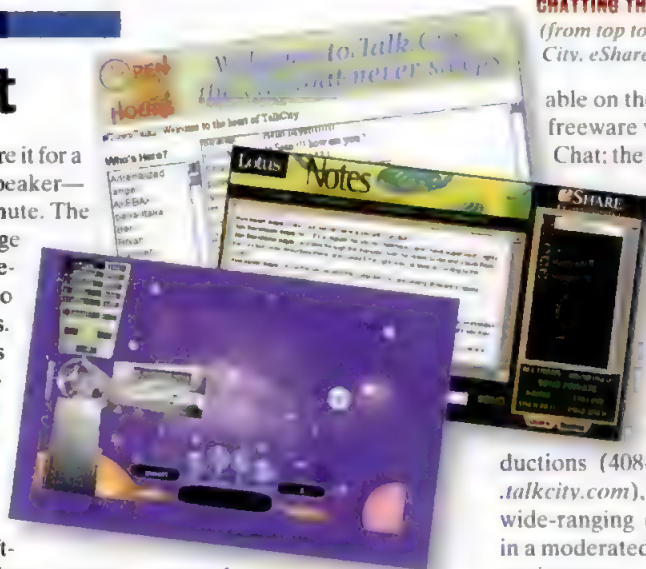
CHATTING THE NIGHT AWAY:

(from top to bottom) Talk City, eShare, and E-Pub Chat.

able on the site is a 49-user freeware version of E-Pub Chat; the full-featured Pro version, which includes one year of phone support, sells for \$995.

Since its arrival on the scene last year, Talk City, from LiveWorld Productions (408-867-7401, www.talkcity.com), has featured wide-ranging chat discussions in a moderated, family-friendly environment. The site has recently partnered with CBS SportsLine and Travelocity to set up sports and travel chat rooms.

Founded by former employees of Apple's now-defunct eWorld online service, LiveWorld cultivates its own pool of chat moderators, and its IRC chat client, EZTalk, functions with a variety of software platforms. Talk City is free for chat users.—*Josh Levy*



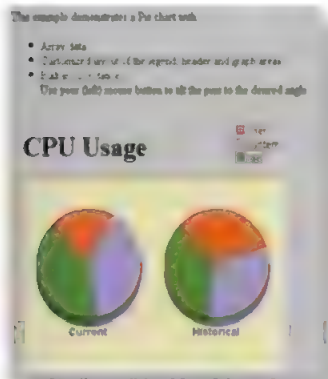
JAVA TOOLS

Bring Your Charts to Life

A colorful chart is always a great way to present tabular information graphically. But wouldn't your charts be even better if that information were interactive? Web developers looking to add multidimensional Java charts to

(800-487-3217, www.rogue-wave.com), JChart provides a variety of fully customizable charts that you embed into Java applets using as little as two lines of code. You can also create new charts from scratch, because JChart uses an architecture based on the Java-Bean event model. Charts can be updated in real time, or you can schedule updates.

Targeting a wider range of charting applications is KL Group's **JClass Chart** (800-663-4723, www.klg.com). This \$399 JavaBean component, which you can use in an HTML page or embed in a Java application or applet, supports a multitude of business and scientific 2-D and 3-D charts: JClass Chart allows you to mix images and URLs with labels, titles, and legends—all of which are in rich text format. You can have a flexible data source for accessing files, JDBC, sockets, and more, as well as for such interactivity as rotating, drilling down, zooming, and scaling.—*Melissa J. Perenson*



CHARTS PLUS: KL Group's JClass Chart.

their Web pages can turn to these two solutions.

Rogue Wave Software's **JChart 1.0** offers developers a Java library with a palette of 2-D and 3-D interactive charts. Available online for \$195 via Rogue Wave's online store

E-MAIL SERVICE

Web E-Mail Comes of Age

Taking off into the crowded skies of free e-mail services are MailCity (www.mailcity.com) and RocketMail (www.rocketmail.com), brought to you by WhoWhere and the Internet directory service Four11, respectively. You can access RocketMail from any location using a standard Web browser, but you need access to an Internet connection because none is provided.

To set up and use the service, simply visit either Web site—no downloads are necessary. When you log on, the browser window becomes a fully functional mail client that allows you to organize messages into folders (these remain stored on the providers' servers), create groups, and check your spelling directly in your browser's window. You can send and receive HTML pages, Word documents, and multimedia files. You can also use both MailCity and RocketMail to retrieve mail from any other POP3 server.

Both services are integrated with their providers' directories, so you can search the listings database and even create your own address book. (You don't need to register with a directory to use the service.)—*Andrew Boscardin*



BLASTING OFF: RocketMail's e-mail.



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TravelPro 2020	\$5,295	200MHz Pentium	32MB	TravelPro 2020CX	\$5,995	200MHz Pentium	64MB
TravelPro 2020	\$5,295	200MHz Pentium	32MB	TravelPro 2020CX	\$5,995	200MHz Pentium	64MB
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TravelPro 2020	\$5,295	200MHz Pentium	32MB	TravelPro 2020CX	\$5,995	200MHz Pentium	64MB
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WEB GROUPWARE

Internal Collaborations

The groupware giants—Lotus Notes, Microsoft Exchange, and Novell Groupwise—bring the power of group collaboration to your corporate intranet, but the sophistication of these offerings may be more than most mid-sized organizations need. Several intranet groupware packages have collaborative features similar to what these packages offer and require nothing more than standard Web browsers on your client PCs.

Available both as a standalone server product and a subscription service, IntraActive's **InTandem** offers users collaborative functionality (800-515-2432, www.intraactive.com). Pricing starts at \$95 per user and \$1,450 per month for 50 users. InTandem provides file sharing, searching (though not of the entire Web), discussion forums, and a schedule and calendar program. The library's searchable archive shows information about each file, database, and document, including who posted it and when; InTandem updates this information whenever a user makes a change.

When you type a URL as part of a message or any other part of an InTandem site, the software automatically creates the hyperlink for you. Adding an event or meeting to InTandem's calendar is an exercise in point-and-click simplicity; most of the details you need regarding time, location, and invited personnel are available in pull-down menus. A system of notifications—via e-mail and a real-time Java applet—are currently in beta. InTandem runs on Windows NT Server 4.0 and several flavors of UNIX. It also works together with popular third-party Web servers such as Netscape Enterprise Server.

Another product in the Web-based groupware category is **Oracle InterOffice** (415-506-7000, www.internetoffice.com). Pricing starts at \$95 per user for the messaging, workflow, and calendar options; \$295 per user for document

management. InterOffice's features can be accessed via a standard Web browser. The package, which either runs on top of your existing Oracle 7 relational database or uses the included runtime version of Oracle 7, works with all clients, including thin-client Java stations and network computers. Oracle is even plugging InterOffice for use with hand-held PDAs. Like InTandem, InterOffice is available as a software package and will be offered as a subscriber service (price to be determined), providing a Web-based intranet for those without the time or resources to run one themselves. A free 90-day trial is available at the company's Web site.

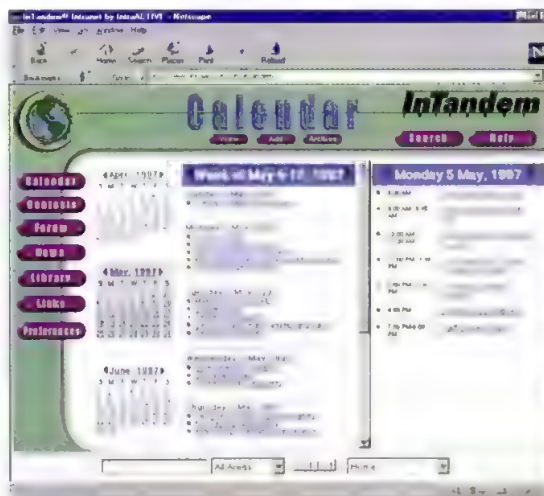
Mustang Software's **Wildcat!** family (805-873-2500, mustang.com) covers a wide range of in-

tranet and conferencing applications. The \$1,125 Business Edition of the **Wildcat! Interactive Net Server** (or WIN Server) can even turn your network into a full-featured BBS, and it includes a report generator to keep track of your users.

the site via the Web. There's instant subscription access and real-time billing capabilities for managing your user base.

WIN Server includes FTP, HTML, POP3, and SMTP servers. A messaging system allows you to

host forums and conferences via e-mail, Usenet news, and private mail; in addition, you can host multiple channels of real-time chat sessions. WIN Server's file-management system has built-in virus scanning and a full library-search feature. WIN Server also features a grab-bag of such site enhancers as an e-mail distribution-list server, a set of system administration and reporting tools, a commerce engine,



TAKING COLLABORATION IN STRIDE: InTandem comes with full-featured calendaring and scheduling.

The Business Edition provides for 16 simultaneous connections, while the \$2,995 Enterprise Edition supports up to 64 simultaneous connections; of course, an unlimited number of users can access

and SoftQuad's HoTMetal Pro 3.0 to assist you in publishing to the Web; to keep your guests entertained, a spread of casino games is available as an add-on for \$129. —David R. Lambert

TELEPHONY

Phone + PC = Power

We once thought that computer telephony was about replacing the PBX with the PC; it was a hardware thing. But it's becoming clear that computer telephony is really about merging the telephone's capabilities into the information presentation of your PC. Think of it as a unified messaging-software thing.

The ultimate objective is to make the telephone invisible—if not extinct. With the availability of voice over the Internet, pictures over standard phone lines, and voice mail with your e-mail, the standard telephone might be an endangered species for many businesses. If your business measures productivity in person-minutes, you might be interested

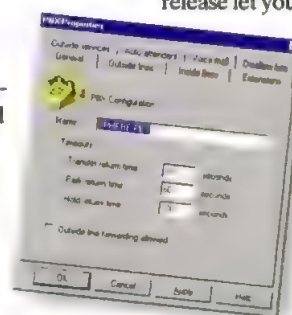
in these new telephone-enhanced applications.

Active Voice's **TeLANophy** (206-441-4700, www.activevoice.com) delivers the necessary link that serves to tie both Novell's GroupWise 5.0 and Microsoft Outlook—the messaging client in Office 97—to telephony services. TeLANophy expands the capabilities of the Novell and Microsoft products to make available the unified messaging tools that are able to access a single mailbox with voice, e-mail, fax, and

scheduling, calendaring, and task messages. Added controls in this release let you handle and initiate

voice calls from GroupWise or Outlook applications while using standard PBX hardware.

Sphere Communications' (847-247-8200, www.spherecom.com) **Spherical** uses ATM to the desktop to eliminate the PBX and to act simultaneously as a LAN (price to be determined). All the switching is done by 25-Mbps ATM. Sphere also glues Microsoft Exchange or Outlook to the telephone for unified e-mail and voice mail and control over calls. —Frank J. Derfler, Jr.



FAMILIAR GROUND: You can manage Spherical's PBX features using the standard Windows 95 interface.

ously as a LAN (price to be determined). All the switching is done by 25-Mbps ATM. Sphere also glues Microsoft Exchange or Outlook to the telephone for unified e-mail and voice mail and control over calls. —Frank J. Derfler, Jr.

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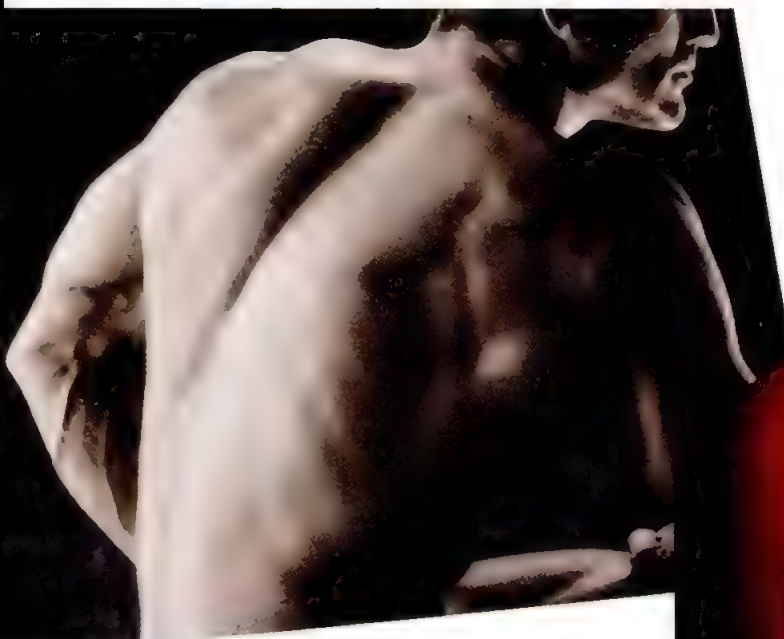


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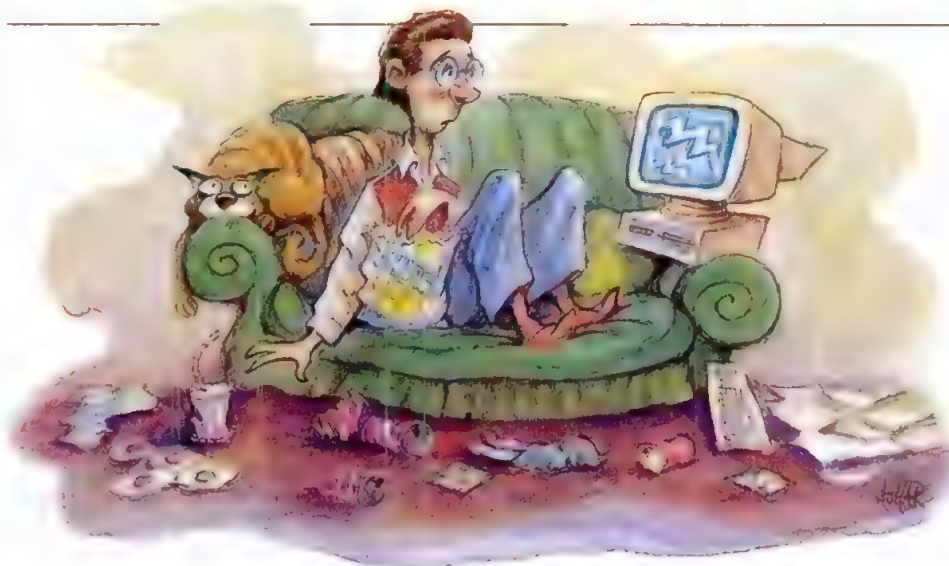


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First Looks



Couch Potato PCs

Gentlemen, start your clickers. These PC/TVs straddle computing and entertainment.—By Bruce Brown

The Internet, computers, television, and telephony continue to compete for the limited attention span of Americans. WebTV-style boxes work from the bottom up by bringing low-cost, bare bones Internet access to television sets. At the same time, PC/TVs attack from the top down, providing what you expect from a PC and adding what you demand from a TV.

Early last year, Gateway 2000's Destination big screen PC started it all with a TV-ready system that had a 31-inch monitor (First Looks, June 11, 1996). NetTV and others quickly followed with large-screen PC/TVs. Toshiba then presented a PC/TV under the guise of a home-electronic appliance with its Infinia line (First Looks, October 22, 1996).

In this roundup, we brought together the four most recent PC/TVs: ELLi Computer's \$3,999 ELLiVision Gamma, Gateway 2000's \$3,899 Destination D5-200, NetTV's \$4,339 WorldVision 97, and Toshiba's

\$2,948 Infinia 7201. The first three use large-screen monitors, while the Infinia, which has a nicely integrated 17-inch monitor, is more appropriate for an office or small apartment than a living room. All were configured with Pentium 200-MHz MMX CPUs, 32MB RAM, and multiple-gigabyte hard disks.

As you would expect from a computing-entertainment hybrid, these systems use handheld remote controls for television functions, while the room-size models use wireless keyboards as well. You'll find no compromise in television-viewing quality with these machines, and playing games and Web surfing take on new dimensions when a group of friends can see all the action together. In fact, after more than a month of in-home testing, the biggest conflict was over who would get the remote control.

You may not want to start up Windows 95 just to get tomorrow's weather forecast. The ELLiVision uses its TV-set mon-

itor for direct television reception, while the WorldVision has two tuners: one in the PC, the other in the monitor. By contrast, the Destination has a deep sleep mode that it can quickly awaken from to display a TV program.

The greatest excitement and potential for PC/TVs is in convergent applications, such as Intel's InterCast. This broadcast system divides the display into three windows: the traditional television screen, extra content sent out via cable, and a hypertext content outline with relevant Web pages shown. The Destination and WorldVision both come equipped for receiving and decoding InterCast.

You probably won't want to sit very close to the screen, though. Besides the big screens' upside limit of 800-by-600 resolution (the ELLiVision maxes out at 640-by-480), these PC/TVs run at a maximum 60-Hz vertical refresh rate to accommodate the television signal. This becomes visually apparent when you switch to a computing application that looks flickery.

Audio is just as important. These PC/TVs use a variety of high-quality speaker setups, at

INSIDE



THE NEED FOR SPEED:

U.S. Robotics' two new x2 modems can speed up your connection a bit. See page 49.

MULTIMEDIA VERSATILITY:

The NEC Versa 6200 MX notebook comes with a 13.3-inch screen. See page 58 for the full review.



MAPPING THE WORLD:

Digital Wisdom's Mountain High Maps Frontiers is a virtual atlas. For the full review, see page 58.



More Products Reviewed . . .

Lotus SmartSuite 97	62
Corel WordPerfect Suite for DOS	62
Microsoft Visual C++ 5.0, Enterprise Edition	70
Borland C++Builder Client/Server 1.0	70
Omnifile Pro	73
Windows 95 Registry books	76

First Looks Online

From April 21 to 25, go online to discuss the x2 modem story, which begins on page 49.

www.pcmag.com/discuss.htm



First Looks



ELLiVision Gamma
Direct price: With MMX Pentium/200, 32MB RAM, 512K external cache, 2.5GB hard disk, 12X CD-ROM, 32-inch monitor, \$3,999
ELLi Corp., Ames, IA
800-365-4672, 515-296-2000
www.elli.com
Circle 408 on reader service card.

least by PC standards. World-Vision and Infinia have built-in speakers, while the ELLi-Vision has monitor speakers plus a separate subwoofer and two satellite speakers. The king of sound is the Destination, which has a separate Harmon/Kardon Dolby Pro Logic receiver as well as six speakers, including a subwoofer.

Although the ELLiVision PC/TV comes with Microsoft Office Professional 97, the other systems come bundled with a varied sampling of home, entertainment, and productivity titles.

We have two favorites among these four PC/TVs. If you want a desktop computer that pulls in both TV and FM-radio signals and also acts like a media clearinghouse, the Toshiba Infinia is an outstanding choice. At the other extreme, for its combination of high-end components and a midrange price tag, the Destination will serve as a valuable addition to your family room.

So put your feet up, lean back on that sofa, and crank up that PC/TV.

ELLi Corp.

ELLiVision Gamma

Rather than just provide traditional couch-potato viewing, the \$3,999 ELLiVision Gamma is in its element as a presentation and training system. Its 640-by-480 video mode produces characters large enough to be read at a distance.

Because the system sends signals to the display via an S-video connection, you can use this system with any S-video-ready television or multimedia monitor. During evaluation, we used a 32-inch Panasonic CT-32G31 Pana-Black television set, which comes with the ELLiVision Gamma system; you can buy the PC system without a monitor for \$3,099.

The ELLiVision system uses a desktop case, measuring 6.4 by 17.7 by 17.5 inches (HWD). The Panasonic television measures

26.3 by 33.5 by 21 inches and includes integral speakers. Components include a Seagate Medallist Pro 2520 2.5GB hard disk, a 12X Teac CD-ROM drive, and a U.S. Robotics 33.6-Kbps modem with voice capability.

For computer audio, the ELLiVision uses a Creative Labs Sound Blaster AWE32 with a Platinum Sound SWX 1600 speaker system, which includes a powered subwoofer and two small satellite speakers. Audio quality is better than most computer speaker systems, but it couldn't measure up to that of the Destination.

The graphics setup combines a Matrox MGA Millenium graphics card with 2MB VRAM and a pass-through cable to a proprietary board using an ATiTech International PC-to-TV chip. To view television, you plug an antenna or cable lead into the back of the TV or monitor. Unfortunately, computer video is limited to 640-by-480 resolution at a flickery 60 Hz. Matrox software can elongate the display to 640 by 960. Up close it's not pretty, but when you move back six feet or more the image looks fine.

You can control the ELLi-Vision with a smooth-operating Logitech Surfman infrared mouse and a Keytronic infrared keyboard. The television has its own remote control used to select channels, adjust volume,

and set video modes.

The ELLiVision Gamma was a terrific performer, leading the field in Business Graphics WinMark 97 and Business Winstone 97 tests, but it had the lowest display resolution for computer applications. The Panasonic television set that comes with the ELLiVision system is great for TV viewing, but the restriction to VGA mode limits this system's appeal for home use.

Gateway 2000

Destination D5-200

The original PC/TV keeps getting better, as the \$3,899 Destination D5-200 improves performance and drops its price.

The desktop case measures 7.2 by 17.1 by 16.5 inches and the 31-inch diagonal monitor is 27.3 by 30.5 by 21.5 inches. The D5-200 includes a wealth of excellent components: a 2.5GB Western Digital hard disk, a 12X CD-ROM drive, an Easy Photo snapshot scanner, a 33.6-Kbps modem, and a six-speaker Harmon/Kardon Dolby Pro Logic stereo system.

The STV VideoRage Display Multimedia controller with 2MB VRAM will run the Destination monitor in 800-by-600 mode, although it is described in the documentation as 640 by 480. At 800 by 600, the system doesn't meet FCC Class B specifications for

BENCHMARK TESTS

PC/TVs



The ELLiVision Gamma system, the only one of the four PC/TVs that ran at 640-by-480 resolution, was the overall performance leader. It had the best scores on the Business Winstone 97 and Business Graphics WinMark 97 tests. The NetTV WorldVision 97, with its 3.2GB IBM hard disk, had the highest Business Disk WinMark 97 score.

We used ZD Winstone 97 and ZD WinBench 97, with 32MB of RAM on each system.

	ZD Business Winstone 97 Score	ZD Business Graphics WinMark 97 Score	ZD Business Disk WinMark 97 Thousands of bytes per second	ZD CPUmark ₉₇ Score	ZD CD-ROM WinMark 97 Thousands of bytes per second
ELLiVision Gamma	44	83.3	804	413	989
Gateway Destination D5-200	43	73.1	687	424	1,040
NetTV WorldVision 97	42	78.9	866	379	835
Toshiba Infinia 7201	38	71.4	781	370	1,130
Average Pentium/200 MMX Home PC (2/4/97)	37	49.5	685	372	930

Higher scores represent better performance.
Bold type denotes first place.

use in homes, but even in that mode you won't want to sit closer than four feet from the screen.

For word processing from across the room, browsing the Web from a sofa, or blasting a few aliens from the floor, the Destination can't be beat. Since the TV tuner is on the video card, the computer must be on to watch TV. But if the Destination is in sleep mode, hitting a TV button on either the remote or the keyboard can wake the system in television-viewing mode.

The Destination uses a wireless radio-frequency system for its remote control and keyboard. This is much more reliable than an infrared link, because you don't need an unobstructed line-of-sight connection between the transmitter and receiver. The remote also has a trackball with buttons.

Gateway includes a load of software with the Destination. In addition to Microsoft Works for Windows, Quicken SE, 3D Atlas, Cinemania 96, and Encarta 96, there are numerous games and educational titles. In benchmark testing, the Destination was middle of the pack with neither surprises nor disappointments. For versatile family-room computing and television convergence, the

Editors' Choice

- Gateway 2000 Destination D5-200
- Toshiba Infinia 7201



Owing to the divergence of thinking about how to build the best PC/TV, we have two Editors' Choices. If you think that the PC and TV were meant to be combined in a big-

screen format, then Gateway 2000's Destination D5-200 is for you. If you think that the PC's place is on the desktop, then Toshiba's Infinia 7201 is a great choice.

At \$3,899, the Destination is the value leader. Packed with productivity, entertainment, reference, and educational software, the Destination comes with the Storm Easy Photo drive, a useful add-on for family use. The Harmon/Kardon Dolby Pro Logic stereo receiver with five speakers plus subwoofer is also a terrific addition.

Like the earlier Model 7200, the Infinia 7201 is replete with elegant design elements, including multiple ways to turn on and control the television, radio, and telephony features. Lacking the Destination's party-level sound system, the Toshiba's integral speakers reach fine vol-

ume levels with clear, rich sound.

The ELLiVision's limited resolution made it the least effective of the three big-screen systems for traditional productivity computing, but we feel it would be fine for education and training. The WorldVision is the most integrated of the three family room models, with support for Intel InterCast and the CouchWare control system.



Destination offers some great value and entertainment for the money.

NetTV, Inc.

NetTV WorldVision 97

The WorldVision 97 is the most flexible of the tested PC/TVs. There are a variety of ways you can control and combine television and computing. At \$4,339, it's

also the highest priced of this foursome.

The system includes an IBM DeskStar 3.2GB hard disk, an 8X CD-ROM drive, an ATI 3D Rage II graphics video board with 2MB VRAM, a 33.6-Kbps modem, and a SoundBlaster16 audio card. Speakers are

built into the monitor, but you can add a set of external, self-powered speakers for high volume events. The WorldVision's system unit is the approximate size of a VCR, measuring 4.3 by 17 by 16.5 inches. The display is 23 by 26.5 by 20.5 inches overall.

Two infrared remote controls and an infrared keyboard control the WorldVision. One remote works when you use the television independently of the computer. The other includes a joystick-like pointing device and a full set of TV-control buttons. You also can run the TV with Moon Valley's CouchWare, which lives up to its name by allowing you to play games, chat with friends either online or via video phone, browse the Web, or check a television schedule, all without rising from the couch.

The WorldVision system is also InterCast-capable, so you can receive extra content from networks that broadcast using this standard, such as NBC, CNN,

Gateway Destination D5-200

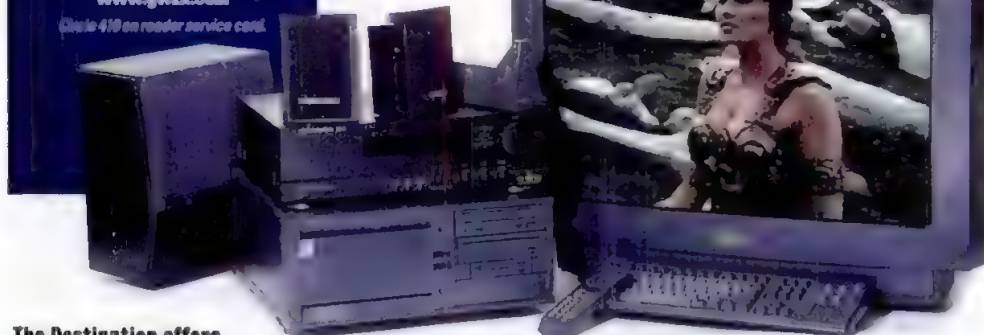
Direct price: With MMX Pentium/200, 32MB RAM, 512K external cache, 2.5GB hard disk, 12X CD-ROM, 31-inch monitor, \$3,899

Gateway 2000, North Sioux City, IO

800-940-2000; 815-232-2000

www.gw2k.com

Circle 410 on reader service card



The Destination offers great value as well as true PC/TV convergence.

First Looks



The person with the remote will have true control of the WorldVision.

NetTV WorldVision 97

Suggested Retail Price: With MMX Pentium/200, 32MB RAM, 256K external cache, 3.2GB hard disk, 8X CD-ROM, 29-inch monitor, \$4,339

NetTV Inc., San Rafael, CA; 800-440-6388 415-498-1021

www.net-tv.net

Circle 411 on reader service card.

and MTV. The system's hard disk netted the WorldVision the top Business Disk WinMark 97 score, but its other benchmark test scores were average. The WorldVision comes with Corel's Perfect Works, Enhanced CUSEEME for Windows, Mech Warrior 2 ATI 3D SE, Wipeout, Assault Rigs, CD Atlas, and CD Encyclopedia. The NetTV WorldVision 97 runs the gamut of television control options.

Toshiba America Information Systems

Infinia 7201

If the thought of spending the rest of your days and nights on the couch scares you, you should check out Toshiba's \$2,948 Infinia 7201, which keeps your computer and television squarely on the desk.

The cheapest of these four PC/TVs, the Infinia isn't suitable for viewing by groups, but its 15.8-inch viewable diagonal screen is fine for individual viewing. The slightly bulbous tower case measures 16.7 by 9.5 by 19 inches. The 7201's component list includes a 3GB hard disk, 12X CD-ROM drive, 33.6-Kbps data/fax modem with voice support, a

full duplex speaker phone with Synchro Connect telephony software, an SRS-enhanced wavetable FM synthesizer, and a 2 MB, 64-bit 3-D graphics accelerator.

A combination TV/FM-radio/video capture card brings the world of media to the Infinia. You can use the on-screen interfaces or the remote control, or you can use the InTouch Module. This device hangs on the front of the monitor and offers quick-access buttons to most-used items as well as a master volume control.

The Toshiba runs at higher graphics modes than the big-screen systems. Top resolution is 1,280 by 1,024 at 256 colors. All modes can run at a 75-Hz vertical refresh rate, but when the television component is running the rate drops to 60 Hz. When you

turn on the television function or switch between partial and full screen, an annoying audio-overload sound blares momentarily. Otherwise, the speakers produce a crisp and pleasant sound. Benchmark-test scores were generally low, with the exception of the Toshiba 12X CD-ROM drive, which led the field.

Toshiba bundles a wide selection of software with the Infinia, including Microsoft Encarta 97, Mayo Clinic Health Manager, Get Ready for School Charlie Brown, Quick-En SE, Investor Insight, Microsoft Works, Microsoft Money, and Family Album Creator. A variety of games are also included.

The Infinia's sole trade-off

for its top resolution and graphics modes is that the relatively small screen limits the computer's use with desktop applications. Even though the other three PC/TVs were all designed to fill up a huge room, the Infinia 7201 is an excellent compliment to a small room or business desktop. □

Toshiba Infinia 7201

Street Price: With MMX Pentium/200, 32MB RAM, 256K external cache, 3GB hard disk, 12X CD-ROM, 17-inch monitor, \$2,948

Toshiba America Information Systems, Computer Systems Division, Irvine, CA 92618-3343; 714-583-2000

www.computers.toshiba.com

Circle 412 on reader service card.



The Infinia has all the TV you want in a desktop PC.

SUMMARY OF FEATURES

PC/TVs: Side by Side

PC MAGAZINE
EDITOR'S CHOICE

PC MAGAZINE
EDITOR'S CHOICE

Products listed in alphabetical order

	ELI-Vision Gamma	Gateway Destination D5-200	NetTV WorldVision 97	Toshiba Infinia 7201
Price of tested configuration	\$3,999 (direct)	\$3,899 (direct)	\$4,339 (list)	\$2,950 (street)
System dimensions (HWD)	6.4" x 17.7" x 17.5"	7.2" x 17.1" x 16.5"	4.3" x 17.0" x 16.5"	16.7" x 9.5" x 19.0"
Monitor	Panasonic CT-32G31	Gateway-31	NetTV CT-1860	Toshiba Model CA1766M-01
Screen diagonal claimed/measured	32", 32"	31", 30.5"	29", 27.5"	17", 15.8"
Graphics adapter	Matrox Millennium	STB VideoRage Display Multimedia controller	ATI 3D Rage II	64-bit S3 VIRGE 3D-X
Installed memory	2MB VRAM	2MB VRAM	2MB VRAM	2MB EDO RAM
Audio adapter	Creative Labs Sound Blaster AWE32	Ensoniq SoundScapeVIVO	Creative Labs Sound Blaster 16	Yamaha OPL3-SA with SRS 3D
Modem	U.S. Robotics	Telepath Sportster	HPS	Sierra
Top data speed	33.6 Kbps	33.6 Kbps	33.6 Kbps	33.6 Kbps
Warranty (years)	3 for PC, 1 for monitor	3 for PC, 1 for monitor	1	1
On-site service (first year)	Not available	Free	Not available	Free

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512KB pipeline burst cache, flash BIOS
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3.5" floppy drive
100MB Iomega Zip drive

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PCI 64-bit 3D video, MPEG, 4MB EDO RAM
Tool-free minitower or desktop
Microsoft Mouse, 104-key keyboard
Microsoft Windows[®] 95 and MS[™] Plus[™] CD

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Bus. lease \$139/mo

SELECT FEATURES

512KB pipeline burst cache, flash BIOS
PCI 32-bit Ultra SCSI Fast-20 controller
12X SCSI CD-ROM drive, 3.5" floppy drive
100MB Iomega Zip drive

32 voice wavetable stereo sound card and speakers
PCI 64-bit 3D video, MPEG, 4MB EDO RAM
Tool-free minitower or desktop
Microsoft Mouse, 104-key keyboard
Microsoft Windows 95 and MS Plus[™] CD

Multimedia Xcitement Pak, POD, Adobe
PhotoDeluxe, Billboard Music Guide,
Blockbuster Entertainment Guide and
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\$1,499

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4.1GB EIDE hard drive
17" Micron 17FGx, .26dp (15.8" display)

\$1,999

Bus. lease \$68/mo

SELECT FEATURES

512KB pipeline burst cache, flash BIOS
12X EIDE CD-ROM drive, 3.5" floppy drive
16-bit stereo sound card and speakers

PCI 64-bit 3D video, MPEG, 2MB EDO RAM
Tool-free minitower or desktop
Microsoft Mouse, 104-key keyboard

Microsoft Windows 95 and MS Plus[™] CD
Microsoft Works CD
5-year/3-year limited Micron Power warranty

MICRON MILLENNIAPRO2 200

Intel 200MHz Pentium Pro processor
16MB EDO RAM
3.1GB EIDE hard drive
15" Micron 15FGx, .28dp (13.7" display)
Microsoft Office CDs

\$2,199

Bus. lease \$75/mo.

Intel 200MHz Pentium Pro processor
32MB EDO RAM
4.1GB EIDE hard drive
17" Micron 17FGx, .26dp (15.8" display)
Microsoft Office CDs

\$2,599

Bus. lease \$88/mo.

SELECT FEATURES

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processors
256KB internal L2 cache, flash BIOS

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16-bit stereo sound and speakers
PCI 64-bit 3D video, MPEG, 4MB EDO RAM

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Microsoft Mouse, 104-key keyboard
Microsoft Windows 95 and MS Plus[™] CD
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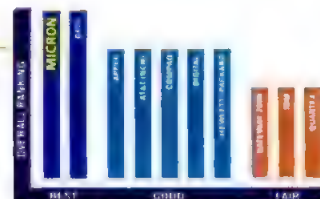


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Source: PC World best overall PC company for reliability and service: December 1995

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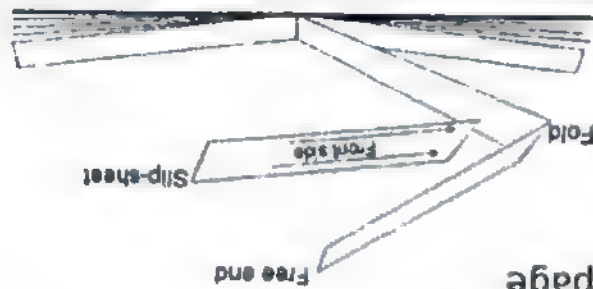
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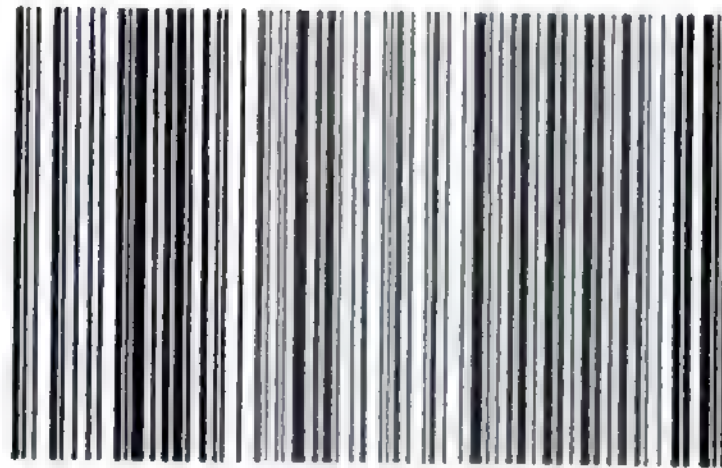
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1. Front side touching the free page
2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Inverted Foldout slip-sheet



GbsSlipSheet-001

Folded edge of the page

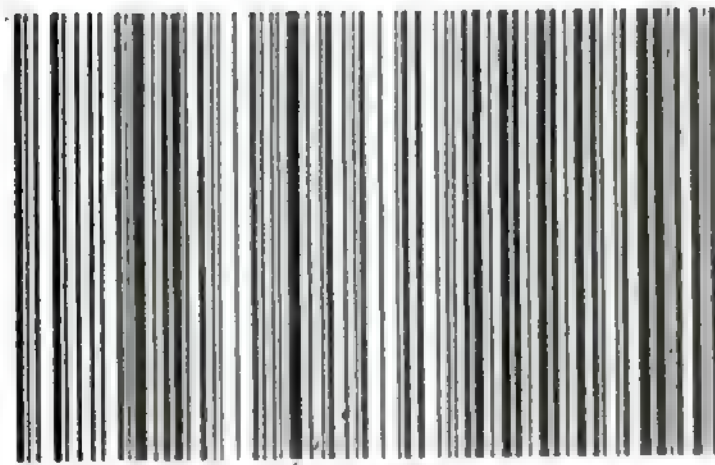
Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
 1. Front side touching the free page
 2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back



Gbs5ipBack-0018

Back

1. Follow instructions on the other side

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32MB EDO RAM
3.1GB EIDE hard drive
17" Micron 17FGx, .28dp (15.8" display)

\$2,599

SELECT FEATURES

512KB pipeline burst cache, flash BIOS
12X EIDE CD-ROM drive, 3.5" floppy drive
100MB Iomega Zip drive
32 voice wavetable stereo sound card in P200
Advent A/270 2x25 watt stereo speakers in P200
16-bit stereo sound card and speakers in P166
33.6 fax/modem, speakerphone, voice mail
Microsoft Phone telephony software

Internet ready: SPRYNET Internet trial membership, Microsoft Internet Explorer
America Online and CompuServe trial memberships
PCI 64-bit 3D video, MPEG, 2MB EDO RAM
Tool-free minitower or desktop
Microsoft Mouse, 104-key keyboard
Microsoft Windows 95 and MS Plus! CD
Microsoft Works CD

SystemSoft SystemWizard application for automated problem resolution
Quicken Financial Pak: Quicken Deluxe, Quicken Financial Planner, Quicken Parents' Guide to Money, Quicken Family Lawyer
Family Pak: ABC by Dr. Seuss, Thinkin' Things Collection 1, Earthworm Jim and Mechwarrior 2
Microsoft Home Bundle
5-year/3-year limited Micron Power warranty

OPTIONS

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32 voice wavetable stereo sound card with 2MB RAM \$99¹
Advent A/270 Powered Partners stereo speakers \$79
Advent A/370 Powered Partners stereo speakers with subwoofer \$199

STORAGE/MEDIA OPTIONS

Adaptec 2940U Ultra SCSI Fast-20 controller \$100
(upgrade from system with standard Ultra SCSI Fast-20 controller)
Plexor 12Plex 12X 1.8MB/sec SCSI internal CD-ROM drive \$200²
(upgrade from systems with standard 12X EIDE CD-ROM drive)
Iomega Ditto 3200 (1.6/3.2GB) \$199
Travan tape backup with tape \$999³
Sony 4/8GB SCSI DDS-2 DAT tape backup with tape \$999³

COMMUNICATION OPTIONS

33.6bd V.34 internal data/fax modem \$139¹
33.6bd V.34 internal telephony data/fax modem with full duplex speakerphone and voice mail \$159⁴

NETWORKING OPTIONS

3Com 3C509 network adapter \$99
3Com 3C905 Fast EtherLink PCI 10/100 network adapter \$159

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HP DeskJet 690c printer - photo-quality color printing for the home, complete with cable \$319
HP LaserJet 5L-FS printer - affordable B&W printing, complete with cable \$419
HP LaserJet 6P printer - full featured B&W printing, complete with cable \$799
Additional DeskJet/LaserJet models available. Please call for details.

SOFTWARE OPTIONS

EdVenture Pak: Sheila Rae the Brave, Putt-Putt Saves the Zoo, Reader Rabbit's Reading Development Library 1, Freddy Fish and the Case of the Missing Kelp Seeds, and the Thinkin' Things Collection 2 \$69
(available only on desktop and notebook systems with Windows 95)
Quicken Financial Pak: Quicken Deluxe, Quicken Financial Planner, Quicken Parents' Guide to Money, Quicken Family Lawyer \$69
(available only on desktop and notebook systems with Windows 95)

DISPLAY/VIDEO OPTIONS

17" Hitachi SuperScan 1711 (15.9" display) 26dp color monitor \$150⁵
21" Hitachi SuperScan (20" display) .26dp color monitor \$650⁵
Number Nine Imagine 128 series II video card, 4MB VRAM \$299⁶
Number Nine Imagine 128 series II video card, 8MB VRAM \$549⁶

SERVICE OPTIONS

Optional 1st year on-site service⁷ coverage included
Extended 2nd year on-site service⁸ coverage for desktop systems (with system purchase) \$79
Extended 2nd year on-site service⁸ coverage for desktop systems (after system shipment) \$99
Extended 2nd & 3rd year on-site service⁸ coverage for desktop systems (with system purchase) \$99
Extended 2nd & 3rd year on-site service⁸ coverage for desktop systems (after system shipment) \$139

DIGITAL CAMERAS

Kodak Digital Science DC20 camera \$199
Kodak DC25 digital camera \$499
Kodak Digital Science DC50 zoom camera \$699

OTHER OPTIONS

APC Per7T surge suppressor \$39
APC Pro7T surge suppressor \$59
Microsoft Natural Keyboard⁹ \$49
(upgrade from standard keyboard)

¹ Upgrade from systems with standard 16-bit stereo sound card

² Requires SCSI host adapter

³ V.34 modem includes trial memberships to CompuServe and America Online

⁴ V.34 modem includes trial memberships to CompuServe and America Online, requires sound card

⁵ Upgrade from systems with standard Micron 17" 17FGx color monitor

⁶ Upgrade from systems with standard 64-bit 2MB video card

⁷ 1st year on-site service is available in the United States and in limited areas in Canada from third-party service provider per customer's agreement with provider

⁸ 2nd year and 2nd & 3rd year offerings are available in the United States only

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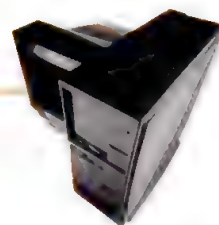
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Designed for
 Microsoft
Windows 95

PC WORLD
DECEMBER 1996

PC MAGAZINE
FEBRUARY 1997
MICRON MILLENIA
MPC P200



First Looks

HIGH-SPEED MODEMS

Hurry Up . . . and Wait

U.S. Robotics' first x2 modems are clearly faster, but they fall short of 56-Kbps throughput.—By Les Freed

After nearly a year of hype and what seemed like interminable delays, we've finally put our hands on the first of a new generation of high-speed modems. We looked at the \$275 U.S. Robotics Courier V.Everything 56Kbps modem and the \$225 Sportster 56K Faxmodem. Externally identical to the V.34-based Courier V.Everything and Sportster products they replace, these modems have the potential to boost connection speed by more than 50 percent. Unfortunately, it all really depends on how good your telephone lines are.

GOOD NEWS, BAD NEWS

We gave x2 modems to a dozen users scattered across the country. About two-thirds of them experienced significantly faster connections with x2 than with V.34 modems. The good news is that where x2 worked, it worked well consistently, providing connection rates of up to 52 Kbps.

The bad news is twofold. This initial x2 implementation falls short of the manufacturer's claim of 56 Kbps, and many telephone lines we checked were only capable of getting to 33.6 Kbps. For the most part, throughput between 45 and 48 Kbps was typical. At these speeds, Web surfing is noticeably faster and file transfers zip along in a little more than half the usual time.

Ironically, we were able to get a 56-Kbps connection when we connected the Courier modem to the POTS port of a 3Com Impact IQ ISDN adapter, but this is technological overkill. Nevertheless, we achieved the more sedate speed of 40 Kbps using the same modem attached to an analog line at the same location.

By calling these products 56K modems, U.S. Robotics and the

other proponents of this technology have led us to expect more from these products than can be delivered. At best (and under current FCC regulations), these modems will deliver a maximum of 53-Kbps throughput.



TWO OF A KIND: U.S. Robotics' Sportster 56K Faxmodem (top) and Courier V.Everything 56Kbps modem (bottom) deliver the data.

Like all modems, x2 modems negotiate the highest possible data throughput upon connection, and they adjust the connection speed on the fly to account for changing conditions. Noise, phase jitter, and other telephone-line gremlins still affect connection speed. The noisier the line, the slower the maximum speed.

ONE-WAY STREET

Unlike previous V.34 and V.32 modems, x2 modems are asymmetrical. This means that data flows into your system from your ISP at x2 speeds, but it travels from your system to the ISP's server at the slower V.34 speed. This is fine if you're

mainly interested in Web surfing and file downloading. On the other hand, it's no help if you host a Web site on your own or routinely send large files from your PC.

The asymmetrical nature of x2 also means that there are separate host and client modems. Two client modems can't connect via the x2 protocol. If you were hoping to call your company's server from home at 56 Kbps, you're out of luck—until

the server is upgraded to handle x2 traffic, that is.

For several years, we've been told that 33.6 Kbps is the end of the line for modems. Conventional analog modems send data over phone lines by first converting the digital data—ones and zeroes—into a series of audio tones. The tones travel across the telephone network until they reach the modem at the other end, where they're converted back into digital data.

Two things limit a modem's maximum speed. First, the frequency response of a telephone line is fairly limited, so modems must use a narrow range of audio frequencies to move the data back and forth.

Second, the audio-to-digital conversion process performed at the telephone company's central switching facility introduces a small amount of noise into the audio signal.

These factors are embodied in Shannon's law, which states that the maximum possible rate for data communications over a dial-up telephone network is about 35 Kbps. x2 and other 56K technologies manage to work with a loophole in Shannon's law by routing the data via a digital line from the telephone company's central switch to the ISP's server. By taking advantage of the quieter line provided by the host-side digital connection, x2 can achieve higher overall download speeds. All other things being equal, the shorter and cleaner your line to the telco switch, the better your connection speed will be.

The vast majority of lines coming into ISPs are digital T1 or ISDN PRI (Primary Rate Interface) lines. ISPs prefer digital lines because they provide cleaner connections than analog lines. A single T1 or ISDN PRI line can accommodate up to 24 users at once, and the lines are often cheaper than the equivalent number of analog lines.

WARNING SIGNS

Problems arise when you factor in some of the tricks the telephone company plays to get the most out of its lines. Many phone lines are multiplexed together using a device called a Subscriber Line Concentrator, or SLC. The SLC combines 24 or more analog phone lines into one digital signal for transmission over a pair of copper wires.

The problem is that many older central switches can't directly connect to an SLC line. At these locations, the SLC line is converted back to analog form, and each analog line is individually connected to the central-office switch. Digital phone switches—the majority

“It’s the
strangest **thing,**
at **CDW,**



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and when my ear itches.”

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HEWLETT
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First Looks

of switches in use today—reconvert the analog phone signal to digital format once more for connection over the phone company's digital network.

The bottom line: If your phone line is on a nondigitally connected SLC, you're out of luck; x2 and other 56-Kbps modems simply will not work on these lines. In some areas, you may be able to convince your phone company to bypass the SLC and give you a dedicated nonmultiplexed line, but those lines are in short supply. Laptop users looking for near-ISDN speeds from their hotel rooms will be equally disappointed. That's because x2 technology won't work behind most office or hotel PBX systems unless the PBX is attached to a T1 or ISDN PRI line.

Most modern PBX systems are digital, so they convert each extension's analog signal into digital form. If you place a call on an outbound analog line, the PBX reconverts the digital sig-

nal into analog form, causing the same multiple-conversion problem.

WHO YOU GONNA CALL?

As we went to press, America Online, MindSpring Enterprises, and several smaller ISPs were publicly testing x2 sys-

Many ISPs who might want to adopt x2 won't be able to do so without investing in new equipment. For example, many ISPs use Ascend dial-up routers to connect their customers, but Ascend's modems are based on the Rockwell modem chip set and can't be upgraded to x2.

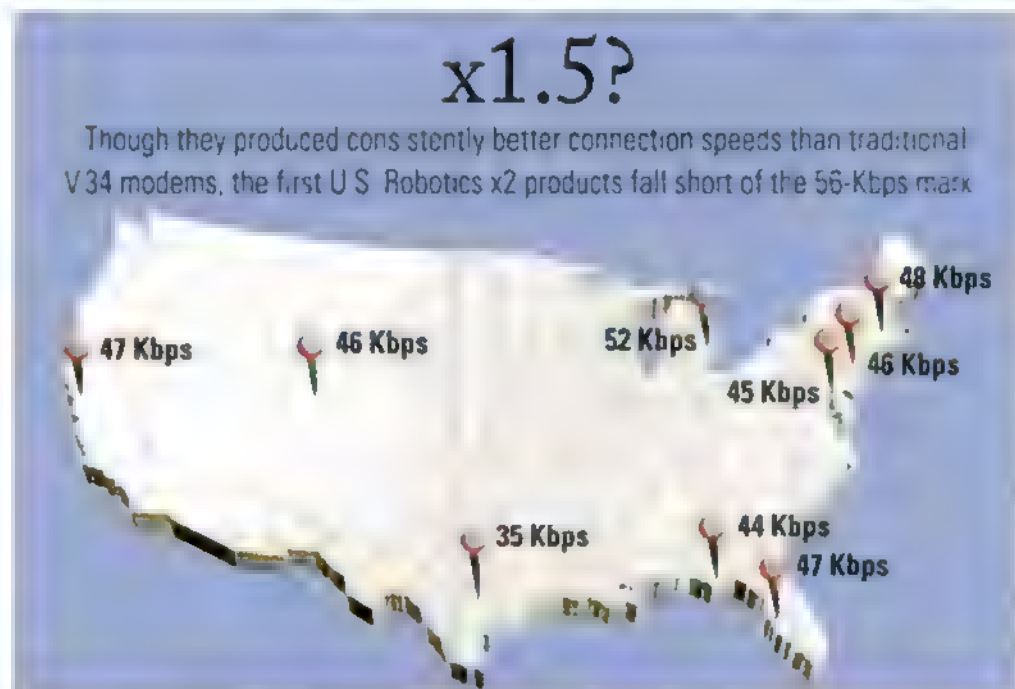
technology, this standard is competing with x2 for the attention of modem-makers and consumers.

CATCH X22

When it works, x2 provides near-ISDN speeds at a fraction of the cost. But be sure to try before you buy. If you're eligible for a free upgrade, you have nothing to lose. If you're planning to purchase an x2 modem or firmware upgrade, you should first try to borrow an x2 modem from a colleague and test it on your phone lines.

U.S. Robotics has a test program available that tells you if your line is x2-compatible. Unfortunately, the test program only works if you already have an x2 modem.

Courier V. Everything 56Kbps. List price: \$275. **Sportster 56K Fax-modem.** List price: \$225. U.S. Robotics Inc., Skokie, IL; 800-342-5877; fax, 847-982-5151; www.usr.com. *Circle 408 on reader service card.*



tems. CompuServe will likely be the next big online service to roll in x2 coverage. Expect to see nationwide deployment over the next year.

The wild card is that an alternative standard—K56Flex—is being introduced as well (see the sidebar “K56Flex: The Other Route to 56K”). Using similar

K56Flex: The Other Route to 56K

Everyone likes a competitive marketplace, but in the battle over high-speed-modem standards everyone loses with non-interoperable modems. Although the vendors promise that every 56-Kbps modem sold today will be upgradable to the eventual ITU standard, there's a lot of confusion out there.

U.S. Robotics was first out with x2 technology, but a competing consortium of vendors—the Open 56K Forum (www.open56k.org)—backs a high-speed-modem transmission method called K56Flex, developed by Lucent Technologies and Rockwell Semiconductor Systems. 3Com Corp., which recently acquired U.S. Robotics, is one of the founding members of the Open 56K Forum, so there's speculation that this will add impetus for a converging standard covering both x2 and K56Flex.

Like x2, K56Flex transfers data at higher speeds downstream (to your

PC) than upstream (for your PC). The other caveats that come with x2 also apply to K56Flex: It is limited by the quality of your phone connection to your ISP, and the host side of the connection must have a digital connection to the phone system.

Expect to see some of the first K56Flex products from the following vendors:

- Motorola Information Systems Group (508-261-4000; www.mot.com/MIMS/ISG) announced it will ship internal and external models of ModemSurfr 56K and VoiceSurfr 56K modems at street prices of \$160 to \$200. Motorola also announced Tidal Wave, an upgrade plan for the modems once an ITU standard is final.
- Hayes Microcomputer Products (770-441-1617; www.hayes.com) announced K56flex versions of its Accura and Optima modem lines, with estimated retail prices ranging from \$180 to \$310. Hayes has also offered a \$99 limited-

time-only trade-in program for owners of any vendors' modems. The wild card is Hayes's acquisition of Cardinal Technologies (717-293-3000; www.cardtech.com). Cardinal's Connecta x2 modems carry street prices ranging from \$160 to \$220, depending on the model.

- Diamond Multimedia Systems (800-727-8272; www.diamondmm.com) announced the SupraExpress 56i internal modem, with a list price of \$169.95. Diamond has plans to follow this internal model with a SupraExpress 56e external and a SupraExpress 56 Sp speakerphone.

In addition, Logicode Technology (800-735-6442; www.logicode.com) has announced shipment of x2-enabled Quicktel modems with street prices ranging from \$130 to \$320, depending on the model and features. Logicode also announced free upgrades to an ITU standard for its customers.

—Todd Spangler

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reliability and performance earned us three Editor's Choice awards from PC Magazine in 1996. And, every one of our systems is custom built so you'll be sure to get exactly what you need, not what someone wants to sell you. So, keep this in mind while you're shopping. Once you see what's out there, we're sure you'll be back.

AWARDS



September 24, 1996
SAG STA Pentium Pro 200



February 20, 1996
SAG STF 166 Pentium



February 20, 1996
SAG STF 150 Pentium

STA QUAD PRO 200MHz

2 Pentium Processors,
Expandable to 4
64MB ECC 4 way Interleaved
Memory to 1GB
Slots: (6) PCI, (4) ISA
Adapter 2940 UW
9.1GB 7200 RPM Ultra Wide HD
16x CD-ROM
Imagine 128 MB VRAM Video
Keyboard, Floppy Mouse
12 Bay Tower 450 Watt Power
\$7900
27GB Ultra Wide RAID 5 Solution
\$12713

STA DUAL PRO MHz SMP

Built in Expandability with SMP
1 Intel Pentium Pro 200MHz
Processor Expandable to 2 CPUs
Slots: (4) PCI (3) ISA
64MB of 50ns RAM Expandable
to 768MB
#9 722 4MB VRAM Video 3D
IBM 4.3GB IDE HD (9.5ms)
SB 32 PMP Sound and Speakers
Sony 16x CD ROM
Keyboard, Floppy Mouse
Windows NT Workstation
MidTower Case 230 Watts
\$2533
4 4GB Ultra Wide Bms Solution
\$3175

STA PENTIUM 200MHz

Intel's New Tucson Motherboard
1 Intel Pentium 200MHz CPU
512K Cache
32MB of EDO RAM Expandable to 128
Slots: (3) PCI (1) ISA (1) Shared
IBM 4.3GB IDE HD (9.5ms)
#9 722 4MB VRAM Video 3D
Sony 16x CD ROM
Integrated 16 Bit Sound with Speakers
Keyboard, Floppy Mouse
Windows 95
MidTower Case
\$1970
4 4GB Ultra Wide Bms Solution
\$2650

POWER DUAL P6 200MHz

1 Intel Pentium Pro 200MHz SM
Processor Upgradeable to 2 CPUs
64MB of 50ns EDO RAM
Expandable to 1GB ECC Supported
Slots: (5) PCI (4) ISA
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Symmetric Glyder MAX BMB Video
Glint Chip Designed
for Open GL Performance
Keyboard, Floppy Mouse
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U.S. Robotics.
(See store for details)

x2 Downloads Nearly Twice As Fast

Introducing x2 Technology from U.S. Robotics. A revolutionary breakthrough in analog modem design that lets you download at nearly twice the speed of today's 28.8 modems*.

By cutting the time you spend waiting for downloads virtually in half, x2 fundamentally changes the face of online communication.

x2 Technology Is Available Today

Any Sportster 33.6 modem purchased after August 15, 1996 is upgradable to x2. Or you can find the Sportster that's right for you, with x2 capabilities already built in, on store shelves today.

Either way, you can start downloading nearly twice as fast with hundreds of Internet service providers supporting x2 Technology.

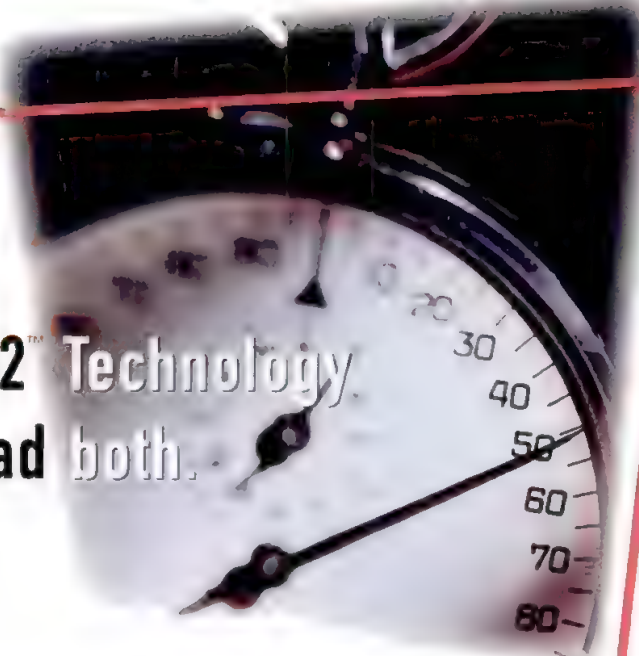
Building a Standard For 56 Kbps*

U.S. Robotics has a long history of supporting international communications standards. And, while the ITU-T committee has not yet recommended a standard for 56 Kbps modems, we

USRobotics®

*All x2 products are capable of 56 Kbps downloads; however, due to FCC rules which restrict power output, current download speeds are limited to 53 Kbps.

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...a Sportster® with x2™ Technology could download both.

are working closely with them to create one. Whatever standard is eventually established, U.S. Robotics will offer the easiest possible upgrade path.

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x2 is already being supported by major chipset makers and original equipment manufacturers, as well as online services with more than 18 million subscribers. With widespread acceptance and deployment from such industry leaders as America Online, CompuServe and NETCOM, it's easy to see why x2 is setting the pace for online speed.

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First Looks

NOTEBOOKS

Versatile MMX

The NEC Versa 6200 MX has many features, but all in all it falls short on performance.—By Cade Metz

Using the same profile and footprint as NEC Versa 6000 machines, the 166-MHz Versa 6200 MX, from NEC Technologies, provides both wide-screen 1,024-by-768 (XGA) resolution and a viewing area comparable to that of a 15-inch desktop monitor. All told, this \$6,399 list system is proficient, but in performance it lags behind that of industry-leading mobile designs from Micron and Toshiba.

The NEC-manufactured 13.3-inch active-matrix color display uses all but a fraction of the 6200 MX's 11.7-by-9.9-inch case cover. The slate-gray Versa is slightly thinner (2.3 inches versus 2.5) than the Toshiba Tecra 740CDT—the other major notebook on the market with a 13.3-inch screen—and not nearly as heavy (7.9 pounds versus 8.8). It surrounds a 166-MHz MMX Pentium chip with 256K of external cache, 32MB of RAM (expandable to 128MB), a Chips and Technologies 65540 graphics chip set, and a user-removable 2.1GB hard disk.



SUPER SCREEN: The NEC Versa 6200 MX provides a 13.3-inch active-matrix display.

In addition, the system has a 4-Mbps infrared port and a 10X CD-ROM.

With such hardware, the 6200 produced mixed benchmark test scores. Compared to six MMX notebooks ("The MMX Files," February 18, 1997), its Business Winstone and CPUmark₃₂ scores were average.

Hard disk and CD-ROM performance was much more impressive: The 6200 MX's Disk WinMark score was second only to that of our Editors' Choice—the Micron TransPort XPE—while its CD-ROM WinMark score was bested only by that of the Tecra. On our application-specific MMX tests, the 6200 MX's performance results were a little better than average, but they still could not compare with the scores of the TransPort XPE.

On the Graphics WinMark test, however, the 6200 MX lagged behind the group. Furthermore, the 6200 MX provided less than 2 hours of battery life, significantly shorter than the 3 hours you can get from the Tecra.

In addition to software-based

.AVI, MIDI, and .WAV playback, the 6200 MX's 16-bit 3-D sound system has two stereo speakers situated between the keyboard and the display. There's a full complement of audio ports (stereo line-in, stereo line-out, headphone, microphone), an integrated microphone, and a volume-control dial.

The 6200 MX's front-loadable VersaBay II slot can accommodate its 1.44MB floppy disk drive, its 10X CD-ROM drive, a second 2.1GB hard disk (\$1,299 extra), or a second lithium ion battery (\$219 extra). On the starboard side of the machine, a PC Card bay offers either two Type II slots or one Type III slot as well as sup-

port for both a 32-bit Card Bus and Zoomed Video. Or you can export audio and video to a television display via the 6200 MX's NTSC/PAL TV-out port.

Although the specs, weight, and screen size may look appealing, the NEC Versa 6200 MX falls short in a few areas, making it a middle-of-the-road MMX choice for those who are on the go.

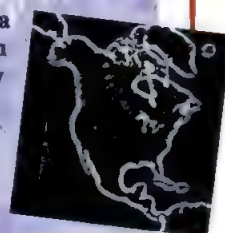
NEC Versa 6200 MX. List price: With Microsoft Windows 3.1 or Windows 95, \$6,399; with Windows NT, \$6,599. NEC Technologies Inc., Computer Systems Division, Mountain View, CA; 800-632-8373, 508-264-8000; www.nec.com. Circle 401 on reader service card.

Digitize Your World

The \$95 (list) Mountain High Maps Frontiers—a subset of Digital Wisdom's Mountain High Maps 2.0—consists of 74 editable high-quality monochrome maps of the world (800-800-8560).

The maps aren't intended to be used as educational or research tools but purely as images, with up-to-date border and political information, such as that used for news programs and other demanding applications. ImSpace Systems Corp.'s Kudo Catalog Reader is included to view map thumbnails. Frontiers' files, however, are intended to be edited directly in graphics or word processing programs. Files can be saved in Freehand, Illustrator, Photoshop, and TIFF formats, and they can be organized by country and state in separate directories.

Each map comes with an alphanumeric filename and a number of masks, including coastlines, borders only, oceans and borders, latitude and longitude lines, city locations, and rivers and waterways. If you need high-resolution maps, look no further.—Bruce Brown



ROCKY RELIEF: Mountain High Maps Frontiers features 74 quality maps.

BENCHMARK TESTS

NEC Versa 6200 MX



The NEC Versa 6200 MX stacked up well in just two categories against the average of other MMX notebooks we tested for First Looks in our issue of February 18, 1997. The Versa 6200 MX's CD-ROM WinMark and Business Disk WinMark scores surpassed those

of the average MMX notebook, but its Business Graphics WinMark and BatteryMark scores were disappointingly low.

We used ZD Winstone 97, Version 1.0, ZD WinBench 97, Version 1.1, and ZD BatteryMark to gauge the performance of the notebook.

	ZD Business Winstone 97 Score	ZD Business Graphics WinMark 97 Score	ZD Business Disk WinMark 97 Thousands of bytes per second	ZD CPUmark ₃₂ Score	ZD CD-ROM WinMark 97 Thousands of bytes per second	ZD BatteryMark Hours:minutes
NEC Versa 6200 MX	33	39.4	671	310	847	1:50
Average MMX (2/18/97)	33	53.0	548	312	658	2:43
	BETTER ►	BETTER ►	BETTER ►	BETTER ►	BETTER ►	BETTER ►

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user friendly.**

When Robert Schienberg plans a corporate takeover, he has a lot to think about. Profit and loss statements, price/earnings ratios, product potential, and much more.

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First Looks

APPLICATION SUITES

The Suite with Smarts

Lotus's SmartSuite can be the glue that binds an organization together.—By Edward Mendelson and Craig Stinson

With the updating of 1-2-3, Lotus's \$399 SmartSuite 97 joins Microsoft Office 97 and Corel WordPerfect Suite 7 as a full-fledged 32-bit application suite with a unified interface and a macro language that works across its range of applications. Except for the rewritten spreadsheet module, SmartSuite 97 appears to be a derivative of SmartSuite 96, with some new features unobtrusively added to enhance ease of use and aid work done over the Internet.

First and foremost, 1-2-3 is now a better corporate citizen. Its interface more closely resembles WordPro, Freelance Graphics, Approach, and Organizer. The sluggish performance of earlier versions of SmartSuite is notably improved, and the whole package feels more responsive, consistent, and stable.

HI-NO, HI-NO...

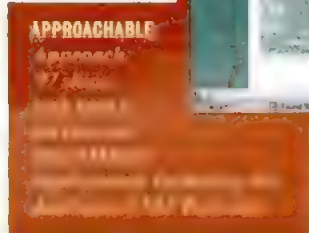
Like its predecessor, SmartSuite 97 is most impressive in the sphere of workgroup collaboration. Although newcomers may find the design to be unnecessarily complex, the team computing features—TeamMail, TeamReview, and TeamConsolidate—provide a nearly complete set of collaboration tools.

TeamMail lets users send messages via standard e-mail transport mechanisms, while TeamReview lets a workgroup comment on and suggest changes for a circulated document. The originator of a group document can customize security levels for each recipient, attach custom messages that pop up when the file is opened, and make the file return automatically to the sender after all workgroup

members have seen it.

TeamReview merges the different comments and edits, but 1-2-3 also has Version Manager, which has been handsomely designed. Version Manager makes its unique scenario-management services accessible to users who might have been intimidated before. And the revamped print preview window sits side by side with the underlying worksheet; you can make changes in one window and see them reflected immediately in the other.

Unlike Microsoft Excel, 1-2-3 doesn't allow different users to work on the same server-based spreadsheet simultaneously, but its collaboration



features definitely outclass the competition. 1-2-3 lacks Excel's ability to create a log of changes, but users can enter comments in a revision-history section of the workbook properties dialog box. SmartSuite lets you send the entire file or just the pertinent portion, such as individual WordPro pages, cell ranges for 1-2-3, or separate Freelance Graphics slides.

If you have Lotus Notes 4.1 or later, you can use 1-2-3's TeamConsolidate command to save 1-2-3 worksheet pages as Notes documents. Notes can then replicate the documents to local and remote users, and

TeamConsolidate can help you reconcile changes into the original 1-2-3 file; 1-2-3 also supports NotesFlow.

SmartSuite's interface isn't as consistent as Office's interface, but it's a step forward. The standard Windows Help engine is used throughout, but in WordPro it is augmented by the ability to respond to plain-English requests (much like those available throughout Office). In addition, Freelance Graphics has a rudimentary Guide-Me feature that lists common questions as a front end to the standard Help interface.

The editing windows throughout the package use a combination of toolbars, "live" status bars, tabbed dividers between document sections, and a squat floating toolbar called

thumbnail images next to the outline text, and any changes made in the outline text are reflected immediately in the thumbnail.

Only a few tools are displayed in each view. On the whole, the program is better suited to users who want quick presentations based on standard designs. Users who want to have the elaborate options in PowerPoint and Corel Presentations are likely to be disappointed.

The downside is that the InfoBox tends to get in the way. You can choose to collapse it to its title bar and tabs, or you can simply close it and get to formatting options from either the top-line menu or the status bar at the foot of the screen.

... IT'S OFF TO WORK WE GO

Internet and network connectivity remains one of SmartSuite's greatest strengths. Special dialog boxes let you specify one or more FTP addresses where you can open and save files. These addresses can also be reused in the future.

WordPro's FTP dialog box lets you save material directly to a Web address. In addition, you can set a default directory on remote FTP and Web sites. This stands in contrast to Microsoft Office's minimal FTP support, which lets you specify only a base FTP address.

An HTML export command works well for publishing 1-2-3 worksheet tables to Web and FTP addresses. It also includes an option to preview the HTML rendition off-line. Freelance Graphics supports the viewing of slide shows simultaneously at different points on a network. When you publish files in HTML format, an option lets you create files in frames. One frame contains a list of links to the slides in your presentation; each slide appears as an HTML page in the other frame.

Unfortunately, when you import Web data to 1-2-3, hyper-

the InfoBox. The tabbed pages on the InfoBox display formatting and other options suitable to the part of a document you're currently working on. For example, graphics options appear when you're modifying an image font, and layout options are available when you're editing text. Your changes are instantly applied, unlike changes made via Office dialog boxes, which don't appear until you close the box.

This arrangement works particularly well for Freelance Graphics, which has a tab for each view of a presentation. One view is used for editing individual slides, another is used for managing thumbnails, and a third is used for outlining. The outline view displays

links are not preserved as they are in Excel. On the other hand, you don't have to deal with the annoyance of Office 97 thinking that anything starting with [www](#) is a live Web site link.

There is Internet support in 1-2-3 that includes Help-menu commands for connecting to the company's home page, product support page, and FTP site. You can also use SmartIcons to pass selected text from your worksheet to the Yahoo search facility. Or you can create worksheet buttons that connect your Web browser with your favorite sites.

Curiously, there is nothing analogous to this in the Approach database.

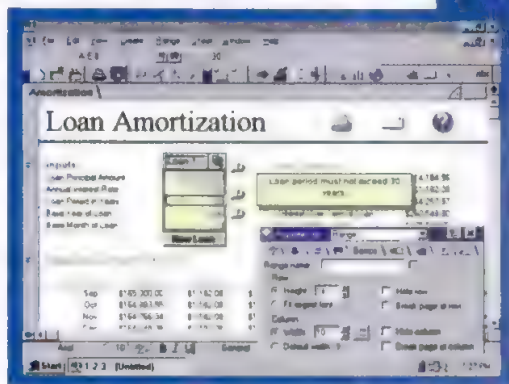
BAR NONE

Every application suite has its own shortcut bar utility, which contains icons that start the suite's individual applications and perform a variety of other functions. SmartSuite's ambitious SmartCenter bar consists of a row of buttons at the top or bottom of your screen. Each SmartCenter button opens a drawer containing icons for documents, applications, Notes databases, lists of Netscape Navigator bookmarks or Internet Explorer favorites, and a special-purpose miniature Web browser that displays local weather, stock quotes, and headlines. Other drawers contain a scheduler and address book linked to Lotus Organizer, which is included in the package.

Once you arrive at SmartCenter with the mouse, you can use the keyboard for some functions but not all. We found that you can't switch to and from other applications using Windows 95's standard Alt-Tab keyboard shortcut. And if you want to do something as simple as customize the key-

board layout in WordPro, you need to write a LotusScript program (in contrast to keyboard-customization dialog boxes found in Word and WordPerfect).

The LotusScript programming language now covers the

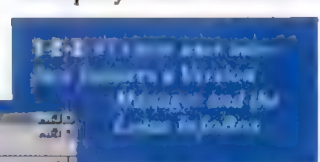


entire SmartSuite gamut. It includes a powerful development environment and supports OLE scripting. Unfortunately, compared to Microsoft's Visual Basic for Applications and Corel's PerfectScript, LotusScript is more difficult to use. It's unlikely to be of much use to nonprogrammers with simple tasks, but developers will prefer its flexibility.

You can now include 1-2-3 in cross-application scripts, and users can add custom functions to the 1-2-3 library. The program's macro recorder currently records only in LotusScript, but old-style macros created in previous versions can be called from within LotusScript. 1-2-3 lacks Excel's easy facility for passing parameters to Web sites and retrieving data—for example, stock quotes or weather parameters—automatically to the worksheet. You can set up links of this sort with LotusScript, but nonprogrammers will probably be intimidated.

The recorder's inability to switch between absolute and relative referencing in the 1-2-3 module is an annoying limitation. When they moved to Lotus-

Script, Lotus dropped support for the C application programming interface, which was used by earlier add-ins for 1-2-3. Third-party vendors must now

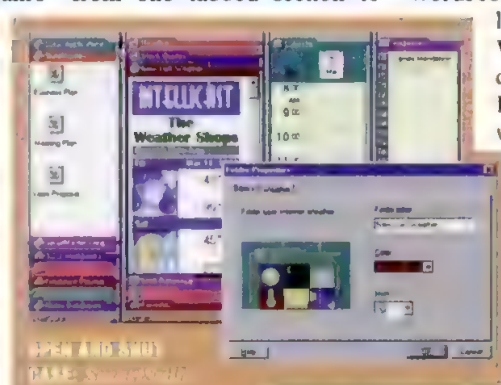


rewrite their add-ins in LotusScript or else drop support for 1-2-3.

The Approach database understands both LotusScript and Approach's original macro language. The macro language itself

now includes a useful send key command, which allows you to pass keystrokes directly to the macro interpreter.

If you constantly move sections of your documents from one place in the file to another, or if you work with compound documents, WordPro's unique tabbed interface can be a real time-saver. WordPro documents can be divided into sections and subsections, each with a tab at the top of the document window. To move from one tabbed section to



another place in the file, you simply drag its tab. Tabbed sections can serve as containers for OLE objects or for WordPro's native text and graphics.

PEST ALERT

WordPro displays files in draft mode, outline mode, or its normal page-layout mode (with an option to display multiple pages as thumbnails). You can edit different parts of the same file in multiple windows, each with a different mode and zoom level. Preset combination views include one that displays an outline view and thumbnails for navigating and a full-size view for editing. But be careful: A nasty bug crashes Windows 95 when you work in draft mode, so choose the option that periodically saves your work. Lotus promises a fix for this problem.

SmartMaster templates are packed with "click here" boxes that you can replace with your own text. Templates for creating Web pages include images and text that look like hyperlinks, but you still have to build the links by hand.

Included OLE controls let you build HTML forms, but you won't find any help on the technicalities of HTML itself (such as how to set up radio buttons). For printed output, desktop publishing features include the ability to flow text between widely separated boxes or pages. On the other hand, WordPro's graphics features lag behind Microsoft Word and the forthcoming Corel WordPerfect 8, which can wrap text around irregular graphics and includes a drawing layer for putting text over a graphic.

With the spreadsheet's AutoTotal feature, you type Total or Totals at the bottom of a set of row labels or next to a set of column labels. Then the program creates the appropriate formula in the adjacent cells. 1-2-3 finally supports the use of outlining buttons, which control the display of subordinate worksheet details.

TRACEY ULLMAN
impersonator



THE VERSA 6200



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Are you often called on to do the job of five people? If so, then we've got the perfect notebook for you: the NEC Versa[®] 6200. In addition to having the largest display of any notebook (13.3"), its unique, modular design allows you to customize the exact computer you need, when you need it. And thanks to its 166MHz Pentium[®] processor with MMX[™] technology, the Versa 6200 is the most powerful multimedia notebook you can buy.

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- ▶ Full-screen MPEG video support
- ▶ 16-bit 3D stereo sound and speakers
- ▶ VersaBay[™] II slot for swapping
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CIRCLE 107 ON READER SERVICE CARD

NEC

First Looks

SmartSuite 97

Continued from page 63

What's missing is the Solver component that Lotus introduced in 1-2-3/G. A trial version of Frontline Systems' Solver add-in (which is essentially the same product that's included with Excel) is available as a free download from Lotus's FTP site. But if you want the complete program, you'll have to buy it from Frontline.

The most important changes in a modestly updated Lotus Approach concern the Internet. A new Internet SmartIcon palette provides direct access to Lotus's home page and FTP server, as well as to the company's tech-support service and a SmartSuite reference library.

Additional icons and menu commands let you save reports, forms, and worksheets as static HTML. You can also publish

the entire database as a read-only Internet document. The latter option employs a new, compact .APT file format.

Unlike Access, Approach doesn't offer a hyperlink data type that would allow you to store links to Web sites

databases. New additions to the Lotus product allow Approach users to display the results of QMF queries and procedures in Approach views. You can also import QMF forms in order to create an Approach report.

Approach does not apply validation rules to data arriving via the import command, and it lacks an integral Autonom field type. But like its predecessors, Approach is easy to learn and use, and it comes with more than 50 attractively designed SmartMaster applications and templates.

By the same token, WordPro doesn't match the automatic formatting features found in Word. Nor does it offer the support for long, complex documents found in WordPerfect. Although version tracking is built into Word (and will be available in the

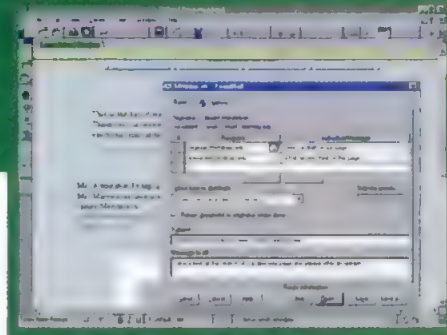
next version of WordPerfect), WordPro's implementation includes the most elaborate range of security options, making it ideal for legal, government, and publishing applications. For garden-variety single-user spreadsheet work, SmartSuite's 1-2-3 lacks some of the power and convenience of Excel. In addition, its abandonment of existing add-ins makes it a potentially unsatisfactory upgrade for at least some of its current user base.

In some respects, SmartSuite has caught up with both Microsoft Office 97 and Corel WordPerfect Suite. In other respects—for instance, by using the application suite as the center of workgroup activities—it sets the pace for the other suite makers to match.

Lotus SmartSuite 97. Street price: \$399. Requires: 12MB RAM, 82MB hard disk space, Microsoft Windows 95 or Windows NT 4.0. Lotus Development Corp., Cambridge, MA; 617-577-8500; www.lotus.com. Circle 406 on reader service card.

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within Approach. Additional file-export options let you save Approach views in rich-text format for incorporation into word processors and other applications supporting .RTF. Also, you can now save Approach forms and reports as plain text.

For IBM shops, Approach adds better integration with DB2

WordPerfect DOS: Still Powerful After All These Years

Who says you need Windows if you want an application suite? The Corel WordPerfect Suite for DOS combines new DOS versions of Corel WordPerfect, Quattro Pro, and Corel Presentations in a \$395 package (upgrade \$129) that includes a cornucopia of fonts and clipart.

All three applications work well together and exchange data easily. The whole package is held together by the WordPerfect Shell—now renamed the Corel Shell—a highly customizable program launcher and file manager that supports 80 separate clipboards for exchanging data among any DOS text-mode application, whether or not it comes in the suite. Corel WordPerfect for DOS 6.2 fixes some bugs; also, paired format codes (such as underlines and italics) can be searched for and replaced without a macro, and all format codes can be edited by clicking on them.

As in earlier versions, formatting and

other commands require fewer and simpler keystrokes than any Windows application, and dialog boxes have drop-down history lists that let you reuse search strings, rerun macros, and reopen files. WordPerfect can be used in one of three editing modes: fast text character mode, WYSIWYG graphics mode, or page-layout mode. Font support includes WYSIWYG display of TrueType, PostScript Type 1, Bitstream Speedo formats, and 1,500 symbols.

Quattro Pro for DOS 5.6 can't compete with Microsoft Excel or Lotus 1-2-3, but it supports multiple-page spreadsheets and includes many useful templates. You can create charts by exporting data to Presentations' charting module and automatically compress a spreadsheet to print on a single page. Imports are limited to Quattro Pro spreadsheets and ASCII-delimited data. Presentations 2.1 is flexible enough to create simple but effective presentations

using any Type 1 or Speedo font. WordPerfect automatically opens graphic files for editing in Presentations, and both use the same WPG 2.0 format for images.

If you want the speed and simplicity of this suite, all these programs run well in a Windows 95 DOS box, complete with graphics. Although the suite can't read Windows 95 long file names—yet—the longname isn't lost when you open and save it in the suite using the file's eight-character name. Minimalist notebook users, law offices and other loyal WordPerfect sites, and those who want to fly through the alphabet will all be well-served by this superb DOS-based suite.—EM

Corel WordPerfect Suite for DOS. List price \$395. Requires: 1MB RAM, 20 MB hard disk space, DOS 3.1 or higher or Microsoft Windows 95 or Windows NT. Corel Corp., Ottawa, Ontario; 800-772-6735; 613-728-3733; www.corel.com. Circle 407 on reader service card.

Introducing the MessagePad 2000, the only handheld computer you can actually use.

Of all the handheld computers, only the MessagePad 2000 offers sharp, crisp backlighting and a 16-level, high-resolution gray-scale screen that rotates on command. Which means you can always see your work in the best orientation — horizontal or vertical, even upside down. And in the best light. Bright. Or dim.

The MessagePad 2000 gives you more flexibility thanks to its two PC slots (other handhelds have only one slot). So, for example, you can dedicate one to a wired or wireless modem and use the other for additional memory.

How much can you do in three to six weeks? That's how long a set of AA batteries lasts under normal usage. Note: normal usage here means a lot. Like having backlighting on, using the modem, crunching numbers, writing e-mail, drawing, doodling, whatever.

Built-in software lets you connect directly to a variety of serial, IrDA and LocalTalk® printers — unlike most Windows® CE devices, which have to be hooked up to a PC in order to print.

There. Fast. And then there's fast. The MessagePad 2000 comes with a screaming 160 MHz KIM processor which offers up to five times the performance of the 20-40 MHz processors you get with other handheld devices.

The usable area of the MessagePad 2000 screen is up to 56% larger than what you'll find on most Windows CE products. So, instead of having to decipher small sections at a time, you can read the entire width of a fax or Web page.

A built-in microphone and speaker let you record and play back voice dictation. And the MessagePad 2000 is the only handheld computer that lets you record and take notes simultaneously.

The MessagePad 2000 works easily with desktop computers. So you can create documents on the MessagePad 2000, then transfer them to and from Microsoft® Excel or Word on any Windows or Mac OS-based system. Or you can keep your calendar and address book current by synchronizing them with desktop programs like Microsoft Schedule+ 7.0 or Claris Organizer® 2.0. And it's easy: with Auto Dock, the MessagePad 2000 makes these transfers automatically.

Unlike Windows CE-based devices, MessagePad 2000 is the only handheld computer that lets you exchange data with both Windows and Mac OS-based computers.

The MessagePad 2000 handheld computer offers a real detachable keyboard (not a tiny, finger-cramping version). So you can quickly and easily type e-mail, business letters, project reports. Only your superb writing style — not your aching fingers — will determine the length of your documents.

Of all the handheld computers out there, only one makes it truly easy to be productive on the road. Introducing the MessagePad® 2000. Rather than just letting you view data, the MessagePad 2000 lets you carry out sophisticated tasks with the greatest of ease. For example: you can now write a full-length proposal, insert information downloaded from the Web — even include pricing from your company's Intranet — and then fax or e-mail it to a client. Try that with an ordinary handheld computer. The MessagePad 2000 has more power, more storage, more flexibility. All contained within the most innovative design, optimized for usefulness. Of course, there's only one real way to understand how incredible the new MessagePad 2000 is: try it yourself. For the name of a dealer near you, or to get more information, call 800-909-0260. Or visit us at www.newton.apple.com/useit.



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- TCO Compliance
- Professional Series

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First Looks

COMPILERS

The Future of C++

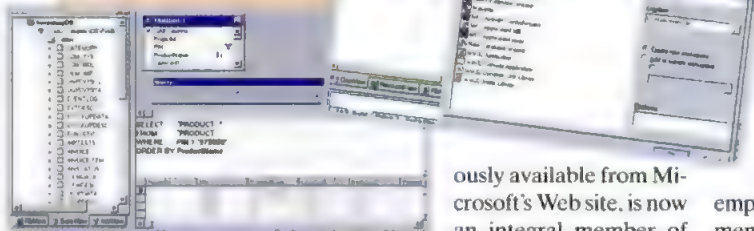
Microsoft and Borland take C++ programming to the next level.—By Richard V. Dragan

With Java getting most of the attention lately, it's easy to forget that C++ continues to be the workhorse of modern computing. Two strong new releases of C++ compilers—Microsoft Corp.'s Microsoft Visual C++ 5.0 and Borland Corp.'s C++Builder—offer unique ease and flexibility. Visual C++ places the emphasis on creating and editing ActiveX controls. C++Builder, on the other hand, takes a RAD approach to creating C++ programs.

of both size and speed. On our tests, we saw roughly a 10 percent shrinkage in program size compared with the same program compiled in Version 4.2.

Visual C++ builds on the interface of its predecessors and

WORRY-FREE CODING: Microsoft Visual C++ offers new control of Web components using the ActiveX Template Library, which is tightly integrated into the AppWizard and ClassView tools. Visual C++ offers remote SQL debugging and live editing of data and table columns.



Microsoft Corp.

Microsoft Visual C++ 5.0, Enterprise Edition

The \$1,199 Microsoft Visual C++ 5.0, Enterprise Edition, improves on a proven, well-known compiler by adding useful tools for building and using ActiveX components.

This version of Visual C++ is part of Microsoft's Visual Studio suite, which offers Visual Basic 5.0, improved performance, and several enterprise features that make it an appealing upgrade. Out-of-the-box, this version of Visual C++ promises better performance for C++ code in terms

works in concert with Microsoft Internet Explorer 3.0 (which is automatically installed on your system if you don't already have it). That's because much of the Help system and tutorials are in HTML pages. Expect to do a lot of back-and-forth between these pages and the poorly implemented table of contents.

Visual C++ has finally integrated a real scripting language—Visual Basic Scripting. With it,

you can record, edit and playback macros, and even write add-on modules from within Visual C++.

Starting a project is done with the AppWizard. Besides such basic target types as Microsoft Foundation Classes (MFC) 5.0 (which are now called Microsoft Foundation Classes and Templates), Visual C++ offers such new target types as ActiveX controls for building Web components.

The library, which was previ-

ously available from Microsoft's Web site, is now an integral member of the Visual C++ family. Other old favorites—basic MFC applications and ISAPI server-side targets, for example—are also available. The AppWizard generates a working skeleton of code for whatever target you choose.

Several tools have been significantly improved since Version 4.2. ClassView, which shows your classes—from objects, methods, and properties—in an object-oriented manner, has been enhanced to allow you to look at and edit properties and objects of ActiveX controls. Visual C++ lets you concentrate on component design, not on the complex and obscure syntax of ActiveX programming.

A big step forward is that FileView now shows subprojects. With it, different project nodes can be kept separate, which is a plus for team development. Visual C++ comes with Visual SourceSafe 5.0, for code control, and Microsoft Repository 1.0, for sharing components within an organization. DataView allows you to view tables graphically for any

ODBC-based database, and Database View offers remote SQL debugging for Microsoft SQL Server and the ability to modify tables and their properties on the fly.

Though Visual C++'s debugging and editing features are powerful, Microsoft doesn't place the emphasis on RAD tool development that Borland does. Still, these features will be a hit with developers who are faced with maintaining SQL Server databases. Microsoft's Visual C++ 5.0 offers new access to ActiveX programming, plus powerful database abilities in an appealing package.

Microsoft Visual C++ 5.0, Enterprise Edition. List price: \$1,199. Requires: 20MB RAM (32MB recommended), 180MB hard disk space; Microsoft Windows 95 or Windows NT 4.0. Microsoft Corp., Redmond, WA, 800-621-7930; 206-936-7329; www.microsoft.com/visualc. Circle 404 on reader service card.

Borland International

Borland C++Builder 1.0

Although Microsoft Visual C++ 5.0 extends the traditional C++ compiler, Borland C++Builder 1.0 (\$1,999) offers a focus on the RAD tool market.

C++Builder adopts the look and feel of the company's popu-

PERFORMANCE TESTS

C++ Compilers



Microsoft Visual C++ 5.0 consistently outperformed Borland C++Builder Client/Server Suite 1.0 on our tests.

The Encryption and Decryption tests measure the throughput of encrypting

and decrypting a 60K file in memory using C++ classes. Executable Size indicates the size of the final test-application executable file generated. For comparison, we report test results for Microsoft Visual C++ 4.2.

	Encryption		Decryption		Executable Size	
	Iterations per 30 seconds		Iterations per 30 seconds		Kilobytes	
Borland C++Builder 1.0	518		1,419		352	
Microsoft Visual C++ 5.0	680		2,228		176	
Microsoft Visual C++ 4.2*	699		2,044		202	

* Reported for comparison.

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The dual-processor capable PowerEdge 4100 also features redundant, hot-pluggable hard disk drives and high-speed fans, plus optional redundant, hot-pluggable power supplies for maximum security. Dell PowerEdge servers with new Ultra-Wide SCSI-3 drives. Twice the throughput for the same price. Call us before we come to our senses.



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First Looks

The Future of C++

Continued from page 70

lar Delphi development environment and shares its powerful Visual Component Library (VCL). You can even borrow Pascal modules for use within C++ programs. There is a price, though: support for legacy code.

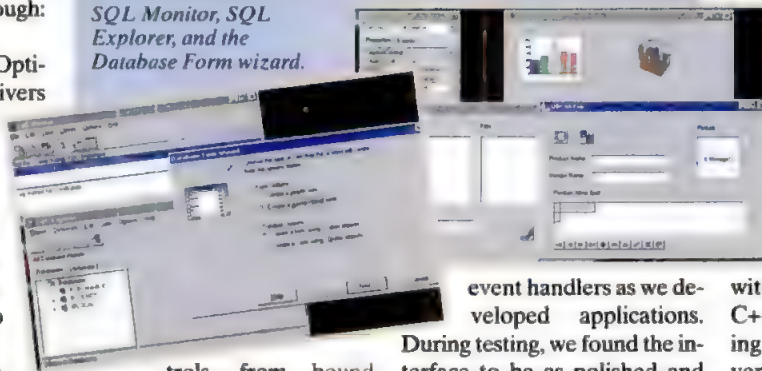
Like Powersoft Corp.'s Optim++, C++Builder delivers component-based programming. Instead of writing code from scratch, it emphasizes dragging and assembling the existing controls. You move components onto forms and then attach code to those objects.

C++Builder offers a sophisticated two-way system for editing code. You can change code manually and the visual design is altered accordingly. We found we could tweak the code and have the changes instantly reflected in the design.

The palette of available components in C++Builder includes over 100 controls from Delphi's VCL as well as ActiveX/OCX controls. The VCL includes stan-

dard Windows components, such as ListView and TreeView controls. But the VCL is exceptionally strong in database-aware con-

TOTALLY RAD: Borland's C++Builder 1.0 lets you mix and match components from the Visual Component Library and ActiveX controls, so you can program faster. C++Builder offers such database utilities as the SQL Monitor, SQL Explorer, and the Database Form wizard.



controls, from bound controls, such as grid, image, text, and memo data fields, to objects that manage databases from sessions, tables, queries, and even stored procedures. There are also network controls for managing common Internet protocols—FTP, HTML, NNTP, POP, SMTP, TCP, and UDP.

The product comes with several flashy prebuilt ActiveX controls. The Object Inspector will

likely serve as your command center. We used it to find forms and other objects and then set properties and attach code to

event handlers as we developed applications. During testing, we found the interface to be as polished and functional as Delphi's.

C++Builder offers good conformance to the ISO C++ specification, including Standard Library support. The only major limitation is that C++Builder doesn't always support legacy code easily; in theory, it compiles legacy code, but going over to VCL means rethinking the design and usually requires you to throw out a lot of code.

For our C++ performance tests, we had to do a little work to adapt our non-VCL project to work within C++Builder.

C++Builder (like Delphi) is ideally suited to database development. You can build queries and attach them to

forms and controls with only light coding. Wizard-based programming is supported throughout the product and includes the ability to design forms visually with live data. You don't need to know much SQL to be productive

with this package immediately. C++Builder is a ground-breaking release that brings the convenience of Delphi and other popular RAD tools to C++ programmers.

Borland C++Builder Client/Server 1.0. List price: \$1,999; upgrade, \$300. Requires: 16MB RAM (24MB recommended), 130MB hard disk space; Microsoft Windows 95, or Windows NT 3.51 or 4.0. Borland International Inc., Scotts Valley, CA, 800-233-2444, 408-431-4122; www.borland.com. Circle 405 on reader service card.

FILE MANAGEMENT

Omni file Does It All

Combining personal information and database management, Omnifile consolidates data.—By Esther Schindler

If you're interested in keeping all your contact and database information in one place, check out Computer Interface Corp.'s \$119 Omnifile Pro. Acting as an information clearinghouse and providing a consistent interface, the program can run in a variety of operating environments: OS/2 Warp, Microsoft Windows 95, and Windows NT.

Omnifile contains databases that help you categorize business and personal data—assisting, for example, with to-do lists, contact information, document tracking, expense management, billing for services, inventory, and appoint-

ments. If you don't want to invest a lot of time in learning powerful, complex systems and just want to get work done, Omnifile may be what you're looking for. Without overwhelming you with fancy features, it will let you easily keep track of your business contacts and expenses as well as all aspects of your business affairs.

Among Omnifile's strengths are a powerful search engine, which selects records as you type, and a system that links Omnifile records. And if the built-in modules aren't enough, you'll also appreciate the report-customizing tools and the

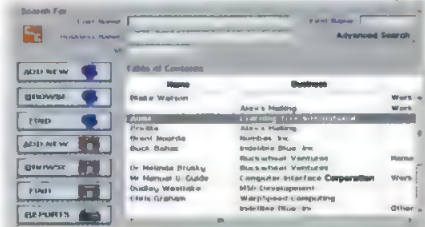
view creator for building simple databases. These can't substitute for an industrial-strength development environment, but small-business users will find them sufficiently flexible.

Many of the features are lightweight and cry out desperately for integration with other tools. For example, you can keep an e-mail address in an individual's record, but you must copy and paste it to your e-mail program. The product also has some rough edges. For instance, it handily lets you link files to an Omnifile record, and you can launch the appropriate application in order to work with a file. But you must know the exact filename, since Omnifile includes no file-browsing capability.

Mere mortals who just want to

manage information about their small businesses will find Omnifile simple, straightforward, and accessible.

Omnifile Pro. List price: \$119. Requires: 8MB RAM, 10MB hard disk space, OS/2 Warp or



3-2-1 CONTACT: Omnifile's contact manager links to several modules, including databases and document-tracking features.

Microsoft Windows 95 or Windows NT. Computer Interface Corp., Natick, MA; 508-651-8111; fax, 508-651-8112; www.computerinterface.com. Circle 403 on reader service card.

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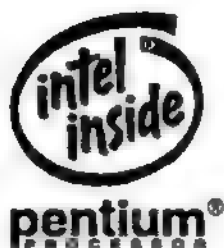
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Diskette Drive	3.5" 1.44MB	3.5" 1.44MB	3.5" 1.44MB
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First Looks

BOOKS

A Peek into Windows' Soul

Zen and the art of Registry maintenance.—By Barry Simon

The Registry has been called the soul of Microsoft Windows 95 because it stores an enormous amount of data that programs must access to start up and operate correctly. Unfortunately, the Registry is at best a

cryptic reservoir of information. But a slew of new books are here to help fathom its depths.

During normal operation, Netscape Navigator makes over 1,000 calls to the Registry as the program starts up. Microsoft's of-

ficial line is that most end users should never need to tangle directly with the Registry.

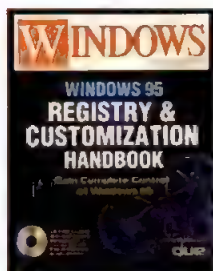
That said, we expect that a serious user will want to consider tweaking, optimizing, customizing, and troubleshooting the Registry.

The problem is that there's precious little documentation from Microsoft on the Registry. For example, you can make some changes via Control Panel ap-

plets, but for other Registry maneuvers you need to get down and dirty. Of these five books, three are aimed squarely at end users, one is pitched at programmers, and one tries to accommodate both.

The existence of these books is testimony to the fear and loathing that the Registry inspires. But as with much else in the PC world, a good book can go a long way.

Making the Most of Windows 95



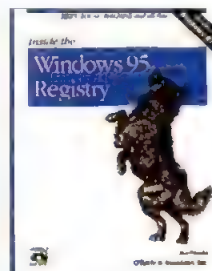
■ Jerry Honeycutt and four coauthors put together the **Windows 95 Registry & Customization Handbook** (\$50) as a helping hand for ordinary users. Because the book focuses on customization and optimization, you won't find extensive discussions of networking or troubleshooting. The most elementary of these five books, the *Registry & Customization Handbook* includes useful tips (how to auto-hide the taskbar, for one) that have nothing to do with the Registry. Unfortunately, there isn't even a cursory review of such advanced topics as using the File Types dialog box in Explorer. The book's CD includes 50MB of shareware programs, which—though not explicitly Registry-related—allow you to customize Windows 95. www.mcp.com/que; ISBN: 0-7897-0725-X.



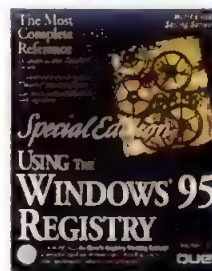
■ John Woram's **The Windows 95 Registry: A Survival Guide for Users** (\$25) is the most accessible of these Registry books. The first half of the *Survival Guide*, a lucid introduction to the Registry and its structure, tells how to use Microsoft's RegEdit program. The remainder concentrates on those parts of the Registry of greatest interest to end users, and it covers those areas in detail. For example, the book has by far the most complete listing of the Shell Icons key around. With chapters on Troubleshooting the Registry and Registry Error Messages, the *Survival Guide* is more than just customization tips. Clear writing, informative graphics, and a well-thought-out focus make this the Registry book of choice for power users. www.mispress.com; ISBN: 1-55828-494-X.



■ In **Windows 95 Registry Troubleshooting** (\$40), Rob Tidrow goes beyond customization and troubleshooting to take a broader view of the Registry. There are chapters on the System Policy Editor, networking, and hardware plug-and-play issues. The book's companion floppy disk includes three Registry search tools and two editors, but the book fails to note that some of these products are shareware. There are a number of points about the Registry—notably that some keys are duplicates of others—that are poorly explained or flat-out wrong. For example, the book's treatment of the HKEY_USERS key—how many subkeys it can have and how to add users—is misleading; following the book's advice could cause major system problems. www.mcp.com/newriders; ISBN: 1-56205-556-9.



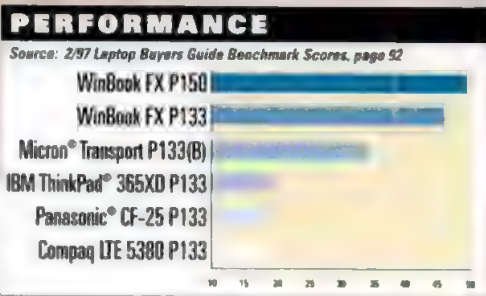
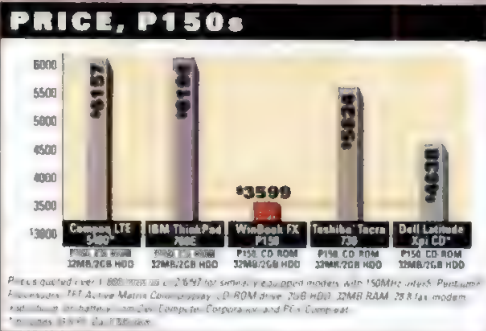
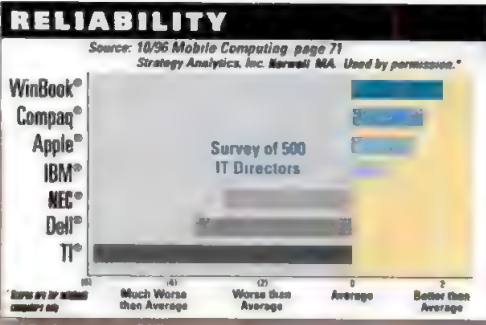
■ **Inside the Windows 95 Registry** (\$33) is clearly aimed at programmers. The thoroughness with which author Ron Petrusha approaches this subject makes this book a must-read for Windows 95 developers. While the bulk of the book's sample code is in C, there is also a chapter for Visual Basic users and a version of Desaware's VB Registry Custom Control. The accompanying floppy disk also includes several tools that let you intercept Windows API calls to the Registry, so you can spy on what's happening. There are even tips on what actions to avoid, how to add your own Registry entries, and which systemwide entries are of interest to programmers. This wonderful book is as precise and informative as the Registry is exacting. www.ora.com; ISBN: 1-56592-170-4.



■ **Using the Windows 95 Registry** (\$60) is the encyclopedia of Registry books. Jerry Honeycutt and a group of authors—different from the ones who wrote the *Windows 95 Registry & Customization Handbook*—attempt to document the more than 3,400 entries made to a clean Windows 95 system. The Registry listing is also provided both in print form and as an Microsoft Access database on a CD. Alas, the book does not list keys alphabetically, so it is difficult to locate exactly what you're looking for. For example, it was nearly impossible to find the Shell Icons key either in the book or on the database. With a file as complex as the Registry, though, even a hard-to-use list has some value. www.mcp.com/que; ISBN: 0-7897-0785-3.

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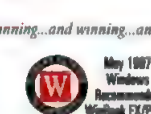
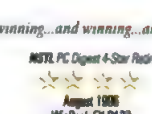
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Second Looks

UTILITIES

Avoiding a Windows NT Mousetrap

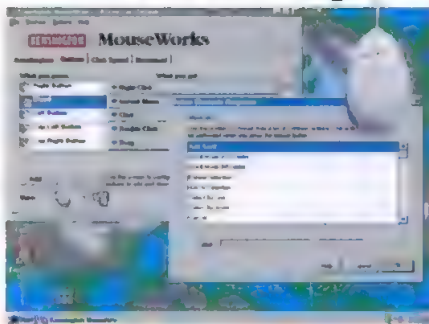
As Jim Seymour indicated in his column, "Help Me, Doc! I've Got This Mouse..." (November 19, 1996), the choice of a pointing device is a very personal matter: You either love yours, or it's a pain in your wrist. Although Kensington Microwave's Expert Track Ball and Thinking Mouse—both four-button devices—are excellent products, the company's proprietary software, MouseWorks, didn't run under Microsoft Windows NT. Sure you could use Windows NT's generic mouse drivers, but you'd miss out on many of the MouseWorks features that can streamline your computing tasks.

Go to the company's Web site (www.kensington.com) and download the Windows NT-compatible MouseWorks 5.02. With the exception of a few minor annoyances, the software is rock solid. In addition to the expected features (adjustable arrow, hour-glass, and trailing mouse tail), you'll find two major improvements over the standard Windows NT mouse driver fare.

To begin with, there are instant configuration files for sev-

eral popular programs—Microsoft Word, Netscape Navigator, and Intuit's Quicken, for example—that include application-specific pop-up menus. In addition, I set up the top two buttons of my Thinking Mouse to take me to next and previous pages when I'm using Netscape Navigator. This is a big help, especially when wading through a complex site.

Then I set the system to auto-scroll when the top pair of mouse buttons are pressed at the same time, something Kensington calls a chord ma-



neuver. Whenever I chord and slide the mouse slightly up or down the pages fly by—a great way to zip through Web pages. In day-to-day use, both of these features are time-savers that reduce mouse travel and number of keystrokes.

Possibly the greatest nui-

sance of using MouseWorks is that the software causes the system to CHKDSK program on each boot-up. Although this is a nice safety feature, it can add a few minutes to an already slow and involved system startup. To add salt to the wound, you need the original driver disk in the system's floppy disk drive when you install the new software. This is because MouseWorks is offered only as an upgrade. Luckily, I was able to find my original disk (MouseWorks 4.2), but keeping old disks around is not a habit of mine.

These blemishes aside, MouseWorks and the pointers that it supports can turn your Windows NT system into a productivity center.

ILLUSTRATION

Patching CorelDraw

Despite a rocky start on the Macintosh platform, CorelDraw 6 remains the professional's choice for illustration programs. To Corel's credit, most of the major bugs

and snags that initially plagued this release have been fixed with a series of patches that are available at the company's Web site (www.corel.com). Today, CorelDraw 6 is what it should have been six months ago when it was released (First Looks, November 7, 1996).

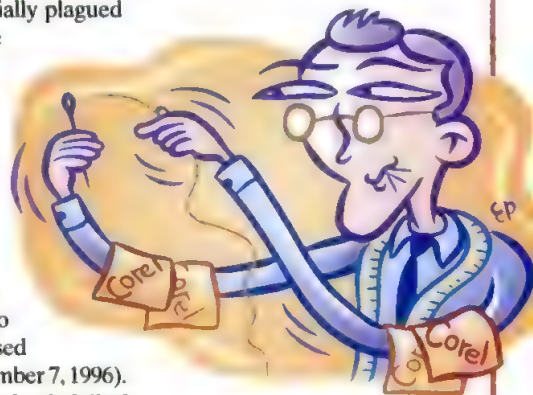
The patches are chock-full of corrections for programming mistakes, quirks, and major problems. For example, if you choose to export an illustration as a 300-dot-per-inch bitmap file, it comes out that way, not as a 72-dpi file as it did with the original release. In addition, incompatibilities with numerous Hewlett-Packard ink jet printers have been eliminated.

For most professionals who use CorelDraw, the big advantage will be the new-found speed of Version 6. Not only is CorelDraw's font caching

much better, but PostScript printing has been optimized.

All told, this is a must-have—and free—upgrade for CorelDraw users. The only drawback is that the CorelDraw Updater is a 9MB file, so set up your browser to download and go get an extra large cup of coffee.

SECOND LOOKS MAILBOX: Tell Second Looks about your experiences with computer products. Contact Brian Nadel via MCI Mail (556-1500), CompuServe (72241.1616), or the Internet (bnadel@zd.com).



BUG BRIEFS

Problem: If you installed Norton Utilities 2.0 for Windows NT on a dual-boot Windows 95 and Windows NT system and have tried to run Norton Disk Doctor from either the properties sheet of drive objects in My Computer or Windows NT's Disk Manager, you have probably seen an error message that the program couldn't find a required .DLL.

Solution: You need to edit the Windows NT registry manually with RegEdit; drill down to HKEY_CURRENT_USER\Software\Microsoft\WindowsNT\CurrentVersion\WinLogon, and change the ParseAutoexec entry from 0 to 1.

Problem: If you've been having trouble with the 1.6GB Western Digital Caviar hard disk in your PC, the disk may be at fault.

Solution: Hewlett-Packard is replacing defective Caviar disks in its Vectra VL line of systems. Call your HP dealer or 970-635-1000 to find out about a replacement.

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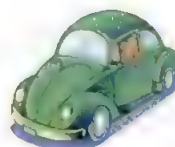
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Turf Wars on the Web

Do you feel like a pawn in a much larger game, one played for high stakes and goals that you can't quite comprehend? It's not your imagination or paranoia; you and I really are just pieces that the big guys are moving around the board in an effort to gain an

advantage over one another. The big guys are toying with us, and it's putting me in a really grumpy mood.

It's not so bad if you're just a user or consumer of Web services—or so you think. Isn't it the developers who have to jump through all the tool vendors' hoops? You download the browser and plug-ins you need to see the pages you want and everything's cool, right? Sure, if you don't mind keeping two browsers on your hard disk and continually adding more plug-ins, DLLs, and patches. And if you don't mind the attendant risks that go with them.

Back in March, Microsoft reacted with commendable swiftness when it discovered that Internet Explorer's short-cut feature permitted unscrupulous Web site builders to gain free access to your system. But ActiveX is still based on trust. Microsoft tells us that signed certificates make it okay, but meanwhile, you're the one with the reformatted hard disk. Your browser already knows how to execute Java, but you have to download 800K of Visual Basic runtime support before you can run your first ActiveX control. I like to know who's sending me what, and my Web browsing is continually interrupted by a never-ending barrage of cookies, certificates, and invitations to extend my browser's capabilities. Yes, they're all attempting to give me a better browsing experience, but it's gotten out of hand.

As hard as it is for consumers and end users, it's ten times as tough on developers. It's difficult enough making platform choices and toolset choices without the little traps and gotchas that the vendors continually dish up.

Time was when companies would compete for the hearts and minds of developers, inspiring them with the rightness of their design, the extensibility of their architecture, the completeness of their tools, the quality of their support. Emotions ran high, but for a seemingly good cause. Platforms were something to believe in. Now it's just a numbers game, laced with traps that make it harder to change horses.

Gripe 1: Why is it necessary to purify a language that's less than two years old? Javasoft's 100 percent PureJava

initiative exists for the primary purpose of preventing Microsoft from running off with the Java language. It keeps the definition of the language at Javasoft, even if Microsoft comes up with better libraries, as it did with C++.

It also keeps developers focused on platform independence, even if all the other platforms combined are just a fraction of Wintel's size. The Java extensions that mix native code and host API calls with Java code are stupid and should be stamped out. Let's make sure, however, that we preserve the good and useful (and secure!) extensions.

Gripe 2: Microsoft hypes ActiveX to developers as though it were somehow equivalent to Java, when in fact it's just the latest incarnation of OLE and COM. The saying about old wine and new bottles comes to mind. OLE was designed to operate in the confines of a single machine or at most on a LAN, where security is a given and all applications are trusted. ActiveX remains a significant security risk.

Gripe 3: Netscape tempts developers with private newsgroups, FAQs, and early access to beta code, but you pay \$95 per year for the privilege. Netscape acts as if it were a platform, but its only real platforms are Javascript (which has nothing to do with Java) and, to a lesser extent, Communicator.

Gripe 4: You can have virtually every development tool that Microsoft makes for free (if you don't mind 20MB downloads, that is). The only catch is that you have to qualify as a Site Builder. So if you

have a site with an Internet Explorer logo on it, you're cleared for Level One membership. Put an ActiveX control on your page, along with the legend, "Best Experienced with Microsoft Internet Explorer," and you're a Level Two. If you're a professional site developer and have at least three ActiveXed sites, you're a Level Three. Oh, and you have to cough up \$2,500 for the privilege. No one actually knows what it takes to be a Level Four, but it's rumored that membership benefits include an overnight stay at Bill Gates's new house.

I could go on griping, but just getting these off my chest has vastly improved my mood. □



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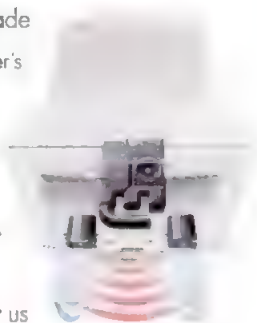
Behind the sleek tooling, dual powered stereo high/midrange speakers, a deep-tuned sub-woofer waits to shape the richest audio your computer can unleash. As Europe's premiere monitor company, Nokia has created a tuning port architecture housed in the monitor's swivel base which allows complete utility plus maximum aural impact.

These systems extend Nokia's most award-winning line: the X series. Gaze into some of the most ergonomic screens in the world—including the first to meet the new

VESA standards for refresh and resolution. Their aperture grill of a mere .25 mm and lavish 15.7" viewing area make the work space simultaneously soothing and exciting. The media-ready series features the first displays to achieve the TCO'95 standard for monitor emissions.

So, if you are preparing to upgrade your monitor—or your computer's audio system—don't overlook these phenomenal displays. They offer a level of superiority you can appreciate even with your eyes closed.

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The Compaq/Cyrix Blockbuster

Compaq's recent introduction of the Cyrix-powered Presario 2100 (First Looks, April 22, 1997) has caught the computer industry by surprise. Some vendors—including Intel—believe that the market for low-end machines selling for less than \$1,000

is negligible. They are dead wrong. This machine will change the face of computing by opening up a whole new market segment.

History shows us that computer buyers are price freaks. Every time a significant price break occurs, they flock to it. Naysayers will tell you that there is evidence that low-end machines don't sell, but this is based on the poor quality of the systems available. During the past year or so, in a Pentium-dominated market, numerous attempts have been made to sell inexpensive, middle-of-the-road 486DX/4 machines.

People want Pentiums. If Compaq can even come close to convincing its buyers that Cyrix's Media GX chip is not a 486 but a Pentium equivalent, then the strategy is home free. It seems doable to me. There is also the brand-name issue. Most of the cheap units until this one were unknown brands. Since Compaq is putting its name on this machine, I believe sales will soar.

Here's the system in a nutshell: Dubbed the Presario 2100, it sells for \$999 and comes complete with Windows 95, the 133-MHz Cyrix Media GX processor, 24MB of RAM, a 2GB hard disk, an 8X CD-ROM drive, a 33.6-Kbps modem, and built-in speakers. A monitor is not included. Expect the price to drop to \$750 by year's end. The Cyrix chip set has all the necessary circuitry for most multimedia applications. And it offers SVGA graphics, which peak at 1,280-by-1,024 resolution.

It's a gutsy move by Compaq. While the company says it's using the Cyrix chip set only because Intel has nothing like the Media GX, don't let anyone fool you into believing that this is anything more than respectful lip service to help Intel save face. Even a year ago, Compaq knew that there was no way it could produce this machine out of fear of angering Intel. Sure, there is no equivalent, but using a Cyrix product keeps Cyrix alive, doesn't it? Intel would prefer to see Cyrix dry up—along with all the other perceived copycats that exploit Intel inventions.

But things have changed in 12 months. The key player in this scenario is not Cyrix but AMD. It's clear that AMD

not only is offering an alternative to the Pentium Pro but seems to have an alternative that is actually superior to the original. If Intel decides to put the screws to Compaq for daring to use a Cyrix chip, Compaq can now turn to a major third source for CPUs: AMD. The irony of all this is that Compaq was one of the original investors in NexGen, the company that actually designed the AMD K6.

Another irony here is that the creation of MMX in itself offered Intel the opportunity to make a low-end world-beater with the chip's DSP capabilities. But after years of releasing supposed high-end servers—from the first 80286 through the Pentium Pro, all of which were gobbled up by end users and used for personal workstations—Intel can't see the market for a cheap and powerful machine. With the Internet being the center of attention, the demand for more power on the desktop seems to have slowed. Besides, every time we get more power, Microsoft and the others take it away from us with more bloated software.

In the middle of this clash will be Dell, Gateway, IBM, Micron, and the other cloners. IBM is in the best position to capitalize, because it actually manufactures some of the Cyrix chips. I'm not sure what Micron plans to do, but I'm certain that Dell and Gateway are just going to watch and see what develops. Both Dell and Gateway are essentially married to

Intel, and I doubt we'll ever see them use a competitor's chip. But if Intel can't help them, their lovey-dovey relationships with Intel may sour fast.

I see a huge market for this type of system. Users looking for a way to trade in their 386/486 PCs and newbies looking for Internet access along with real computing power will buy it. People looking for a second or third machine for the family will buy it. Mac owners wanting to try the Wintel platform will buy it. It will also eat into the sales of \$2,500 machines made by everyone, including Compaq.

There is no doubt that Compaq and Cyrix have created the computer equivalent of the Model A Ford. It's about time someone did.



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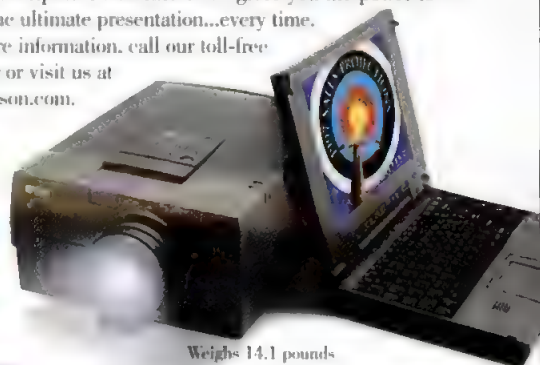
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Inside Track

Here Come Those Cooling Towers Dept.: Remember a few years ago when a couple of companies came out with little refrigerators that sat on top of a souped-up processor? The truth is that if a chip is cooled, it can run a lot faster. Of course the water condensing off these small cooling plants didn't do the system much good. Intel recently "froze" a P6 at a demonstration, and the chip's clock speed soared to 400 MHz. Don't expect this technique to hit the market anytime soon. But once the company shrinks the chip again, we can expect 300-MHz chips to be common. I expect to see 300-MHz chips in production by the end of this year.

And now for some good news, as reported in *Microprocessor Report*. The MMX version of the Pentium Pro (known as the Klamath, and probably to be renamed the Pentium II), widely criticized for being overoptimized for 32-bit operations, has been redesigned to deal better with run-of-the-mill 16-bit software. The result is better performance than what the original Pentium Pro provided. Only Windows NT could take advantage of this feature. Since most users run Windows 95, Intel didn't want AMD and its K6 to have an edge.

Look for a new use for MOS (metal-oxide semiconductor) technology: camera sensors. Over the years people have chatted up the idea of using simple RAM chips as optical targets to capture images. Apparently, if you focus a bright image directly onto the chip, it can be captured as a picture.

No commercial applications have ever come out of this phenomenon. Besides, charge-coupled devices (CCDs) do it better. Currently the two or three companies that make CCDs own the market for digital cameras (as well as camcorders). But CCDs are expensive. Now that the MOS sensor has been perfected, prices should come down substantially, since any old MOS fabrication plant can make them. Expect to see Vivitar and other makers adopt this technology for very low-priced digital cameras. Camera makers hope that MOS chips used for image capture can include the image sensor and the electronics on a single chip.

Factoid: Last year 1.2 million digital cameras were sold. This year, this number is expected to double as more people try filmless cameras.

Smart Card Alert Dept.: As chips shrink and new uses develop, look for the Smarter-than-Smart Card to begin to play a role in computing. We already know that in Germany, a certain floppy disk device's sensor can read and write data to and from the card. At last year's Fall

*Intel cooled down a P6,
and its speed soared
to 400 MHz. Don't
expect this to hit the
market anytime soon.
But once the company
shrinks the chip
again, we can expect
300 MHz.*

Comdex show, Hayes showed a nifty modem that had a built-in Smart Card reader. I predict that by the end of the year these gimmicks will be moot, since Smart Card readers will be installed in drive bays. In fact, IBM plans to install Smart Cards in its Network Station for a variety of uses.

Upping the Ante Dept.: The folks who make those big 5.25-inch magneto-optical drives are now pushing to double the media's capacity. The standard 1.3GB drive recently jumped to 2.6GB, and now I hear rumblings that by year's end it will double again to 5.2GB. Now you're talking.

The reason for this burst of activity is that these guys have not been keeping pace with the rest of the stor-

age world and are actually threatened by tape-drive manufacturers, believe it or not. Quantum and Exabyte are beginning to promote high-speed random access subsystems that can double as cheap backup. The thinking is that optical is not that fast, and since blank tape is dirt-cheap by comparison, there is no reason not to use a tape unit. These technologies never die, do they?

Royalty-Free Art Dept.: Anyone working with Web pages or in publishing of any sort loves to get ahold of inexpensive, high-quality art. Check out these CD-ROMs of great art taken from children's fairy-tale books from the "golden" era of the early 20th century. Ned Shaw, a former illustrator for *PC Magazine*, has gathered a huge collection of classic examples from such artists and illustrators as Maxfield Parrish and Edmund Dulac. He then Photoshopped it (a new verb; you heard it first here) and produced two volumes of fantastic art. The cool part is that the product comes in two resolutions. These rare images are stunning. Generally targeted at the professional art director type, they'd be great for Web-page design. The Golden Pages CD-ROM, \$149 per disk or \$250 for both, is available from The Air & Sky Co. (888-229-1377), or go to www.airandsky.com.

It Was Bound to Happen Dept.: Leif Technologies (513-932-1108) is showing an unusual new tombstone add-on called View.log (about \$5,000 to \$7,000). It's a computerized system with an LCD screen and a couple of buttons that allows people to read your biography, access family tree information, and view whatever else can fit into 250 pages of memory at your final resting place. The double-walled stainless-steel unit is designed to last forever or until Armageddon, whichever comes first. Right now this system displays text and pictures on a grave-stone or cremation urn, but I'm sure more applications will arrive. Call the company for more information. High tech strikes again. □

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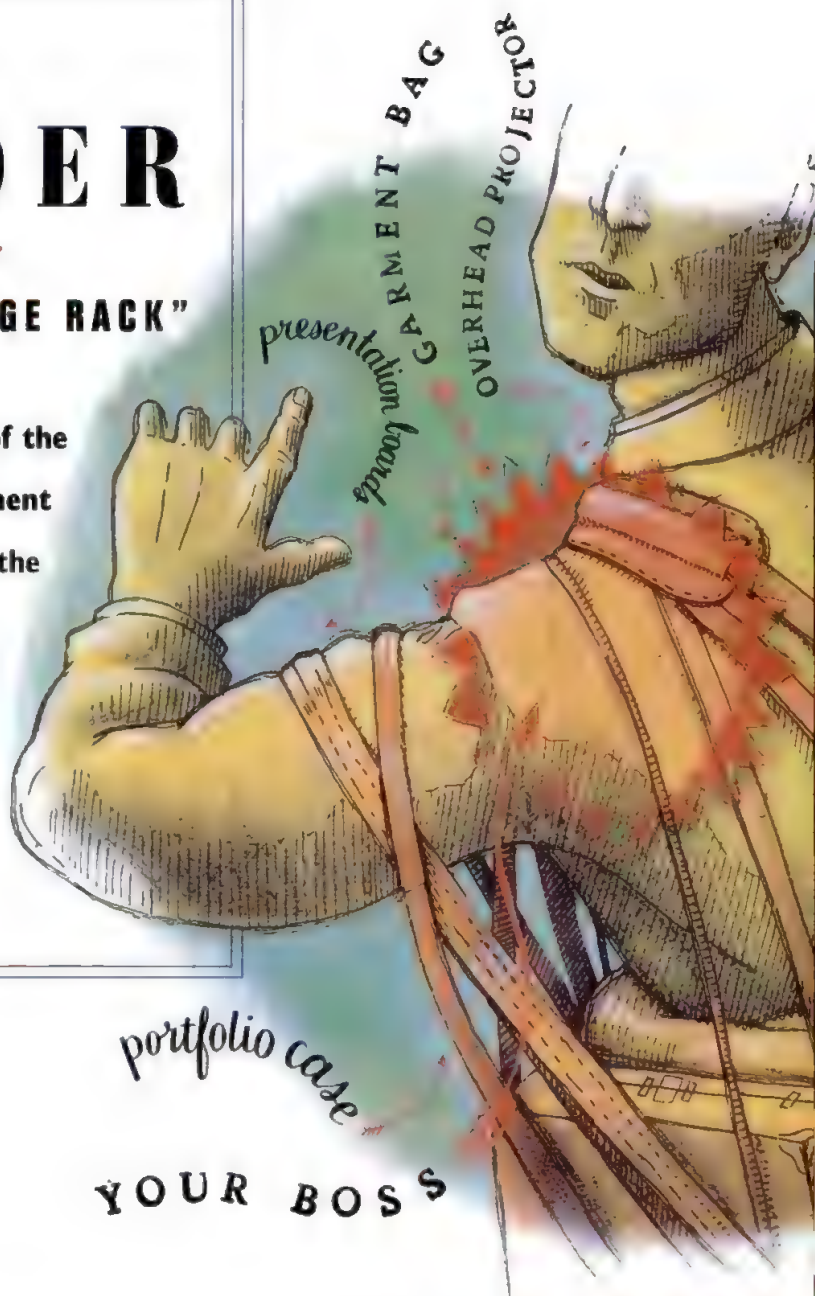
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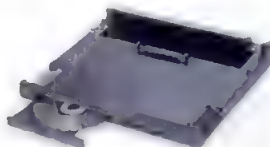
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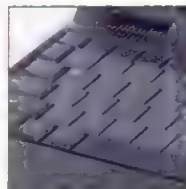
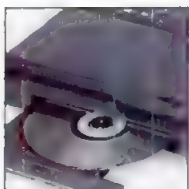
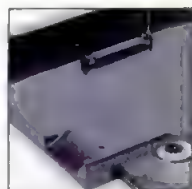
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Servers Come of Age

It wasn't very long ago that we turned our 6-MHz 80286 PC ATs on end and called them servers. And then turned our 20-MHz 80386s on end and called *them* servers. They worked, after a fashion—and we wouldn't be so far into the age of networking

today if we hadn't done that—but by any realistic definition, those were pretty poor servers.

Gradually, real servers appeared (I'm talking about servers from the likes of Compaq, Dell, HP, IBM, and others), and a little later we started to get serious server and network management software. All in all, it's been an amazing transition over about a decade, from the perfectly ordinary PCs we pressed into a kind of service they were never meant to provide to today's fast, powerful true servers with amazingly low prices (witness Dell's very nice little 4100, at less than \$4,000 with 4GB of disk and 64MB of memory).

Unfortunately, that move toward greater sophistication hasn't been accompanied by an across-the-board increase in our own sophistication about the way we buy, set up, and manage servers. I see an amazingly wide range of "server smarts" in my corporate clients' machine rooms, from downright primitive to missile-launching power and sophistication. It's time, I'd say, for a few not-quite-random thoughts on server deployment and network management. Granted, these rules of thumb are only that: broad principles to which there are many specific exceptions. And not everything here applies to every situation. But if you set up and run servers or use a machine attached to one, I think you'll find something of value here.

It's the I/O, not the CPU, stupid. Today, with 200-MHz Pentium Pro servers the norm and a relatively small price delta for those machines over older, slower designs, it's hard to remember that what drives server speed and capacity isn't nearly so much the CPU as it is the performance of the network interface cards in the box and, especially, the amount of memory in the system. I run several perfectly satisfactory, fast, high-availability 133-MHz and 166-MHz Pentium servers, and even rely on a long-time, rock-solid favorite, Hewlett-Packard's NetServer 100LS, a dual-processor 100-MHz Pentium box. Informal tests against 200-MHz Pentium and Pentium Pro servers on the same network don't produce nearly the performance improvement you might expect.

Indeed, they often produce *no* user-detectable performance gains. Why? Well, for one thing, I use fast, reliable NICs. And I stuff servers full of RAM. Servers begin to go to work only at 64MB, and for serious work, you have to put in 256MB. I don't often put in 512MB, because I'd rather add another server to the LAN. Keep reading.

More servers = more performance. This rule of thumb has its exceptions, but in general, I prefer adding more servers to a LAN—even a relatively small one—long before they're needed. Today we talk about all sorts of load-balancing technology to keep our LANs running fast. But there's one load-balancing technique that's independent of new technology: Distribute your LAN's work across more servers.

I like to segment processes and systems by server. In other words, put different functions on different physical machines. An obvious break-out is your intranet. When you brought it up, you certainly increased overall LAN traffic, since this was an entirely new function. Why not run it on an intranet-only server, to keep that workload off your primary servers? Another obvious candidate for its own server: your e-mail system. In practice, e-mail systems aren't usually very demanding on a server, but moving your e-mail activity to its own dedicated hardware server is a great way to load-balance manually—call it brute-force load balancing—to keep performance up

across the network.

Eventually you hit a wall where absolute network bandwidth is truly in short supply, and a move to something like 100-Mbps Ethernet is the only answer. In the meantime, spread the work across several servers and keep things humming. Performance isn't the only gain in adding servers; dividing functions logically by server has payoffs in other areas, too, such as manageability and security.

Multiprocessing should be your norm. Although, as I said, the CPU isn't the big driver of server performance, adding a second CPU to your multiprocessor-capable servers is a great way to step up performance cheaply. This only



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a few thoughts
on server
deployment
and network
management.

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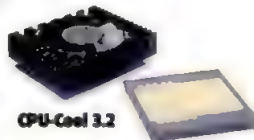


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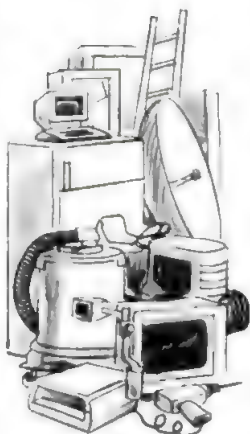
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works, of course, if you're running a multi-processor-aware NOS, such as Windows NT; but a lot of us already are—and only a tiny percentage of multiprocessor-capable servers today have a second (or third and fourth) CPU in them. Some server vendors make adding a second CPU expensive by forcing you to buy an expensive second-processor board. But others have a ZIF socket just waiting for you to pop in an inexpensive second CPU. Adding a second CPU may be the single most cost-effective thing you can do to boost server performance, assuming you have enough memory in the box already.

Switch or die! A year or so ago I went around one of the big network trade shows with a handmade badge that said "Switch or Die!" A lot of people noticed, and many of them commented on the badge, some asking where they could get one of their own. (Those who asked about the badge fell into two groups: About 75 percent grinned and said something like "right on!", while the other 25 percent asked what it meant.)

The point is simple: As your network grows, you're going to segment it into several logical sub-LANs, and either you're going to use switching or you're going to get fired. A "flat" LAN, architecturally speaking, just isn't a very efficient way of moving a lot of data around among a lot of people.

Smart switching and routing can make a phenomenal improvement in performance and effective network management. It takes some thought and effort, to say nothing of capital, to set up effective switching. But the investment will be repaid many times over.

Network management requires tools. If you don't really monitor your LAN, you don't really know what you have, what service levels you're delivering, what service levels you ought to be delivering. I like Frye Network Utilities and Intel's LANdesk system, but there are many other good choices. Buy one or two; install and use them. You'll learn a lot, and you'll stop flying blind.

Network management is a proactive term. You're not managing your network if you just run around installing new PCs and printers, swapping the occasional wiggly NIC, and telling bad jokes about PConline. If you're not working every day to wring more out of the network hardware, software, and wiring plant you have today while actively planning the structure and tools that will define your network one, two, and even three years into the future, you're not managing your network. Period. □

Twenty Questions

In preparing our cover story on 100 great hardware accessories for this issue, I was reminded of how many PC tools now exist to make things easier and simpler. I was also reminded of how many annoyances remain, even with the great hardware accessories

and software utilities available today. To me, these gotchas were created—or never solved—by relatives of the dunderheads who build narrow moving walkways in spacious airports but forget that passengers also carry luggage. It shouldn't take a rocket scientist to figure that out.

Thinking about that got me to wondering how come or why....

- Why does every presentation in Microsoft PowerPoint have titles with mixed-up smart quotes? Now there's an oxymoron: smart quotes. Every title that should read '97 *Goals* actually reads '97 *Goals*. Amazingly, Office 97 companion Word gets it right.
- How hard would it be for every app or utility that reports back big numbers (disk space, federal spending) to be required to use separator commas? Quick now, you have 9181655 bytes free – is that 9MB or 90MB?
- Does the Windows calculator really need to take up one-sixth of your screen? Does anybody really click on the on-screen number buttons to do the math?
- And why does the Quicken calculator cover up the register amounts you may be trying to rekey?
- Do you also find it annoying that when most every Microsoft app pops up it asks, again and again, "Would you like to make me your preferred browser [or image-editing program]?"
- But not as annoying as the AOL sign-on screen ads that try to sell you a book—and then the AOL credit card?
- Why are your PC's volume levels always different when you play different sound clips or games?
- Is there anybody out there who isn't annoyed by blinking Internet ads?
- Is there any personal information manager that *isn't* quirky? Of course, this may be a moot question because Microsoft Outlook, though mediocre as usual in its 1.0 release, will probably kill off the competition, and then you'll have only one quirky PIM to deal with.
- Why don't printer cases have slide-in frames for instruction cards detailing the information you need to make the printer function, like "To fix jam, press Offline, raise cover,

close cover, press Online"?

- Why does Visioneer let retailers put its *scanners* next to the ink jet *printers*, where life-skills-impaired customers try to figure out why the PaperPort can't print demo pages as the HPs and Epsoms do? (True story.)



RANDOM MUSINGS

How many
quirky
annoyances
remain a part of
computing?

- Why don't peripheral vendors put *their* names on transformers? Let's see, does the 6-volt Kang Pao transformer go with the modem or the scanner?
- Why don't software vendors, if they require serial-number entry during installation, put the number on disk 1 (and on disk 2 if it asks for the number when disk 1 is in the drive) as well as on the box, which soon gets lost?
- Why can't lightweight external I/O devices (printers, modems, fax machines, Zip drives) have rear keyhole slots for mounting on the wall?
- Why aren't IEEE 1284 parallel cables—the good ones that you need for some modern printers—all labeled as such, so a year from now you won't wonder if this cable in your cable box is 1284-compliant?
- Why do some affordable small-work-group printers with direct network attachments support NetWare, Unix, and Windows NT—but not Windows 95?
- Why can't Windows offer a truly plain text version of cut-and-paste when you're moving formatted text into an e-mail message? A dash should be changed back to two hyphens, and smart quotes should be dumbed down to nondirectional quotes. Otherwise, you get all kinds of weird marks in your mail where double quotes or symbols once were, and *it's* becomes *its*.
- Why do ink cartridges for ink jet printers cost so much?
- Why does New Jersey's commissioner of motor vehicles go on an AOL forum to read the hundreds of complaints about abysmal service at DMV offices, thank everyone for their thoughts, and then tell them if they're serious, to *mail* him copies of their complaints?
- And isn't it ironic that AOL is where you go to participate in a forum about someone else's poor service?

Have any PC quirks that drive you crazy? Pass them along at the columnists' forum on www.pcmag.com. □



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AcerView 76ic	17" (15.7 Viewable Image Size)	1280x1024 @65Hz	iScreen® On-Screen	.27mm
AcerView 56c	15" (13.7 Viewable Image Size)	1280x1024 @62Hz	Digital Control	.28mm
AcerView 54c	15" (13.7 Viewable Image Size)	1024x768 @66Hz	Digital Control	.28mm
AcerView 34T	14" (13.1 Viewable Image Size)	1024x768 @60Hz	Analog Control	.28mm

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NETWORK EDITION

INTERNET-ACCESS MANAGERS

Surveying the Wave

The new breed of Internet-access managers can help control where your users surf and keep your company out of trouble.



By Steve Rigney

Many companies have policies and rules for using everything from the phone system to the photocopier, so why should using the Internet on a company's network and PCs be any different? Just as with the special code your company issues so you can make a long-distance call at work, employers are starting to define and keep track of what you use your PC for and which sites you visit on the Internet. Companies are doing this for three basic reasons: productivity, liability, and politics. Allowing users to surf the Web all day hurts productivity, viewing questionable material can incur lawsuits, and the sites your employees visit reflect directly on

ILLUSTRATION BY J.D. KING

INSIDE



With corporate Internet access becoming more prevalent, keeping up with who's surfing where and for how long is crucial. In this Network Edition, we

look at products that will arm you with that knowledge and more.

INTERNET-ACCESS MANAGERS are a relatively new category of products, designed primarily for large corporations that want to monitor their employees' Internet usage, block unsavory sites, and develop a corporate Internet usage policy. In "Surveying the Wave," our Network Edition cover story, contributing editor Steve Rigney takes a look at five Internet-access managers. Steve set up these products, implemented their blocking and monitoring capabilities, and did his best to break through to the restricted sites. He found that some of the products will let determined users sneak past.

WITH 56-Kbps MODEMS coming fast and furious, you may be wondering whether ISDN terminal adapters will disappear. In this Network Edition's First Looks, we look at two new ISDN TAs, and if they're any indication, ISDN will be around for quite some time. Contributing editor Les Freed tried out the Diva Pro 2.0 from Eicon Technology Corp. and the TigerJet 128K PCI ISDN Modem. The Diva Pro is a beauty with its built-in fax and analog modem, as well as its solid performance. But if you don't need fax capability or the Diva Pro's POTS port, consider the TigerJet. Since it's only \$99—about a fifth of the price of the Diva Pro—you almost can't go wrong. *Page NE19.*

SOUPED-UP SERVERS are the topic of West Coast PC Labs director Steve Buehler's Multiple Access column. Steve tells you what to believe and what to ignore when it comes to getting functionality built into the server. *Page NE20.*

—Sarah L. Roberts

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your company's image. And this doesn't even get into how bandwidth usage has increased with the advent of corporate Internet access.

For this roundup we looked at five products that allow you not only to see where your users are going on the Internet but to block them from certain sites as well. The products we reviewed are Kansmen Corp.'s LittleBrother Pro, ON Technology Corp.'s ON Guard Internet Manager, Secure Computing Corp.'s SmartFilter, Spyglass's SurfWatch ProServer, and NetPartners Internet Solutions' WebSense. All the products run on a Microsoft Windows NT-based server, and none require client software. Depending on what is more important to you—monitoring or blocking—each of the products has strengths and weaknesses. LittleBrother, SmartFilter, and SurfWatch all provide solid blocking capabilities, and ON Guard's real strength is monitoring; WebSense is the only product that provides full functionality in both areas.

These Internet-usage utilities or -access controllers initially appeared on the market in the summer of 1995. The first products ran as client software on standalone PCs and were mainly designed to protect children from such objectionable material on the Internet as pornography. Not until recently did vendors implement corporate versions of these access controllers that run on dedicated servers and don't require client software. In addition, security is an important requirement of these products; otherwise determined users can bypass them. We tested two types of solutions: proxy servers—SmartFilter, SurfWatch, and WebSense—and network monitors or protocol sniffers—LittleBrother and ON Guard.

A proxy server has two functions: It increases performance by caching frequently visited sites; and it provides security by using two network interface cards (NICs) to segment the Internet connection from your LAN and force users who want to surf the Internet to pass through the proxy server to get to the router and onto the Internet. These functions make these products perfect places to put Internet-monitoring and -blocking software.

None of the products in this roundup, however, strictly adheres to the definition of a proxy server. WebSense uses two NICs but doesn't provide any caching; SmartFilter uses a single NIC; and SurfWatch uses port IDs to segment two network interfaces, a method that smart end users can bypass. All these products force you to point users browsers to them, just as you must with a regular proxy server,

Editors' Choice

• WebSense 3.0



what your users are doing online. The Internet-access managers we tested performed both tasks in one form or another, but WebSense, from NetPartners Internet Solutions, did the best job of both blocking and monitoring.

WebSense, which operates as a proxy server and runs as a Windows NT service, had the most fully conceived blocking options in this roundup. It lets you block access to its database—60,000 sites in 28 categories—and sites you add by both domain name and IP address. SurfWatch is the only other product in this roundup that can block by IP address and domain name. But with the sites you add to SurfWatch,

which means a visit to each user's desktop.

LittleBrother and ON Guard use an approach called network monitoring or protocol sniffing to monitor and block Internet and intranet usage. The software runs on a single PC and monitors every network packet traveling across the LAN, so you have to install the product on every LAN segment. You should also set up a firewall or proxy server to provide extra security. ON Guard can't handle a lot of traffic, and when you try to block more than 3,000 IP addresses, the product fails. LittleBrother does a better job, but it wouldn't work across an Ethernet switch on our test network.

BLOCKING THE SITES

Though some employers may choose only to monitor users, blocking is the most popular method of protecting your company from the dangers of the Internet. To provide good blocking, you must start with a well-designed list of questionable sites. The Internet houses thousands of sites you probably don't want your employees visiting during work hours, and entering all of them into your own database would take days. But all of the products in this review—with the exception of ON Guard—provide lists of at least 25,000 sites. They also allow you to add your own sites and choose

Managing corporate Internet access can mean two things: blocking access to Internet sites you don't want your users visiting and monitoring

you can block only by domain name. SurfWatch doesn't have the monitoring and reporting capabilities of WebSense.

Though WebSense doesn't come with a reporting utility, NetPartners offers a free, downloadable application called WebSense Reporter, which reads the Windows NT Event Log and creates graphical reports based on such criteria as destination sites, amount of traffic, and attempts to access blocked sites.

LittleBrother also has excellent monitoring features that let you monitor network traffic based on IP address, machine name, and even MAC address. LittleBrother can also monitor IPX and WAN bandwidth usage.

among such canned categories as sports, pornography, and hate sites. You can also choose to turn off entire categories or pick individual sites you want to block or allow.

A good list should include both the domain name and the IP address of a site. Just because you block a site by name—*www.playboy.com*, for example—doesn't mean that a smart user can't enter the IP address to find it. On our tests, only WebSense and SurfWatch provided IP addresses and domain names for every site on their lists. However, we couldn't use SurfWatch to block or allow a site manually by using only the IP address.

To test the blocking capabilities of the programs in this roundup, we installed them on a Windows NT-based PC and used a client PC to try to access FTP, Gopher, and Web services running on a Microsoft Internet Information Server. All the products worked as advertised until we tested them using only the IP addresses of some sites. We also connected directly to the Internet to see if the software could block our traffic through the router. WebSense and SurfWatch worked every time, but we could bypass the other products by a combination of using only IP addresses and running the client PC on a different LAN segment.

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NETWORK EDITION

COVER STORY

TO MONITOR OR NOT TO MONITOR

Blocking may be the safest method for access control, but these products also let you simply monitor what your users are doing. All the products provide basic monitoring information, including where users visit, where they try to visit, and the date. Only LittleBrother, ON Guard, and WebSense allow you to use this information to create graphical reports on usage; the other products simply put this information in a log file that you have to search manually to see what your users have been up to.

Except with LittleBrother and ON Guard, all monitoring information is displayed by the user's IP address only. But if you have hundreds or thousand of users, it's hard to determine what address belongs to what user. LittleBrother and ON Guard offer a slight improvement on this method: Each also provides the user's MAC address; LittleBrother even determines the PC's network name. We would like to see all these products include the name of the PC. LittleBrother and ON Guard also provide more information than the other products, including number and amount of different protocols running on your network, and LittleBrother actually provides the amount of bandwidth used. With this type of information, you can diagnose the health of your

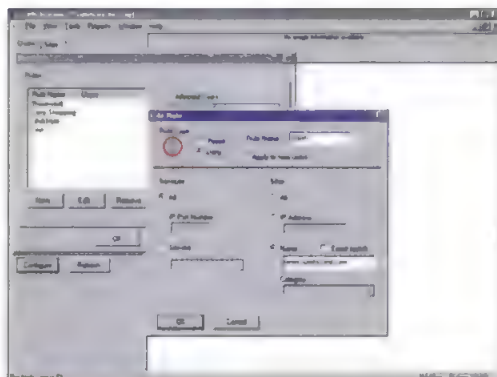
network and plan for more bandwidth as traffic increases.

Except for WebSense, these products were well designed for either blocking or monitoring, but not both. Strong blocking utilities—SurfWatch, for instance—don't provide any reporting capabilities, and strong monitoring products, such as ON Guard, don't do very well at blocking. If you are just concerned with blocking, we recommend a product like SurfWatch. But if you need both blocking and monitoring, WebSense is your best option.

Kansmen Corp.

LittleBrother Pro

Though it's a fairly basic utility, such features as its ability to monitor all network traffic based on IP address, machine name, and even MAC address make LittleBrother Pro, Version 1.0, from Kansmen Corp., a valuable commodity. In addition to its address-monitoring feature, LittleBrother (\$10,495 for 1,000 users) can monitor or block all major Internet/intranet services, including FTP, Gopher, HTTP, NNTP, and telnet, as well as e-mail traffic,



NETWORK'S LITTLE HELPER: With LittleBrother, you can define blocking rules based on DNS name.

and it is the only product in our roundup that can monitor WAN bandwidth usage and IPX traffic. Though we found LittleBrother extremely easy to install and configure, it lacks a detailed manual and its reporting utility can be confusing.

Unlike SmartFilter, SurfWatch, and WebSense, which are proxy servers, LittleBrother works as a network monitor or a protocol sniffer. You install it on your Web server and other servers on your intranet, or on a gateway PC between your network and your outside Internet connection. We couldn't, however, get the product to work

Protecting Your Assets

Besides the attendant loss in productivity, allowing your users to surf anywhere they want on the Internet can have other more damaging consequences for a business, namely harassment lawsuits and—in some cases—criminal prosecution. One way to shield yourself is to develop a corporate policy governing use of the Internet. Though not a panacea, such a policy can make your employees more productive and protect your company from embarrassment and litigious or libidinous users.

Though this legal territory is still somewhat uncharted, if an employee downloads objectionable material—pornography, for example—and another employee sees it, your company could be liable. Worse yet, if a user downloads materials that are illegal within your community, your company could face criminal charges.

In addition, you risk damage to your business's reputation. If they have the right tools, proprietors of other Web sites can tell exactly where visitors originate from, and that's information you don't want to share with your competitors or the public.

According to a Florida attorney, Al Schlechter, your first line of legal defense is a disclaimer that plainly states that the PCs and Internet connections provided by the company are for business purposes and not for personal entertainment. The disclaimer should appear in your employee handbook and, if possible, on company PCs each time they're turned

on. Inserting a text message on any PC running DOS or Windows is fairly easy to do, and even if users never read the disclaimer, your company is protected.

A visible disclaimer may be enough to protect you from most lawsuits, but for double protection you should install an Internet-usage-blocking utility, such as one of those in our roundup. These products let you block access to controversial sites, and even if a determined user gets around your blocks, your effort should protect you from lawsuits.

Furthermore, you usually get one free bite. For example, if a user gets around a blocked site and downloads pornography and another user sees it, due process requires that the offended user alert you before filing suit. This gives you time to talk with the offender and, if necessary, implement a more secure system.

Some employers may also choose to monitor their users' Internet access, but monitoring isn't foolproof. For example, by using another's PC to visit a restricted site, an employee can escape blame.

A disclaimer and Internet-blocking applications are good ideas for companies, but such organizations as libraries and schools can benefit from them too. In fact, any business or organization that has an Internet connection should consider taking steps to implement some type of security. After all, a simple disclaimer and a software investment are well worth the price when lawsuits and reputations are at stake.—SR

ALL THE NICs YOU COULD EVER DREAM OF.

THAT IS, IF YOU'RE TWISTED ENOUGH TO ACTUALLY DREAM OF NICs.

We don't know what Freud would say on the matter of NIC-induced anxiety. However, should you find yourself in a similar state of concern, we'd like to suggest the Compaq Netelligent family of NICs.

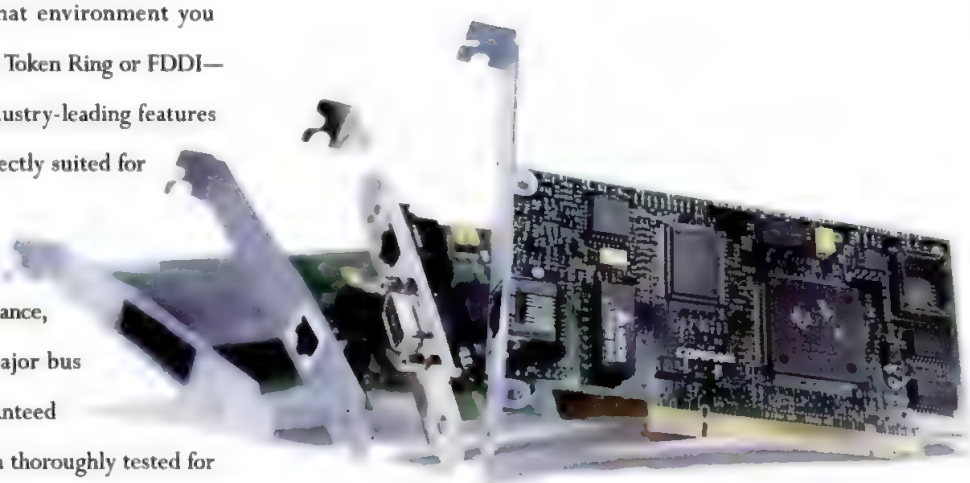
After all, no matter what environment you oversee—Fast Ethernet, Ethernet, Token Ring or FDDI—there's a Netelligent NIC with industry-leading features and price:performance that's perfectly suited for your network.

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COMPAQ

Has It Changed Your Life Yet?

across an Ethernet switch on our network: Kansmen says that you need to install LittleBrother on all the Ethernet segments on your network.

For blocking unwanted URLs, LittleBrother comes with a list of 25,000 domain names divided into more than 40 default categories. You rate existing categories using such classifications as neutral, productive, and unproductive. Any site you deem unproductive becomes off-limits to those on the network unless you specifically permit a user to go there. The list of URLs is updated via e-mail, and you can easily add your own sites. But this version doesn't allow you to edit or add categories, and unlike CyberPatrol Corporate (see the sidebar "Microsystems' List Among Lists"), LittleBrother won't let you block sites based on time of day.

Our favorite LittleBrother feature is the ability to monitor FTP, HTTP, and NNTP traffic by user, site, protocol, bytes transferred, and bandwidth used. On our tests, we were able to see not only where users went but how much they downloaded and what percentage of available network bandwidth was used. LittleBrother lets you track all this information based on the user's IP and MAC Ethernet address, user

name, and client PC name.

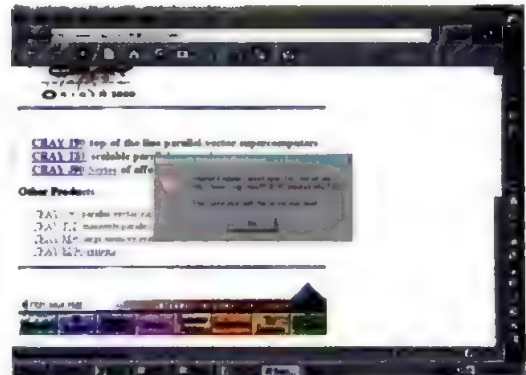
In addition, LittleBrother provides several graphical reports, and you can configure it to send e-mail alerts on Internet usage. The report utility was confusing, however, particularly when defining reports. Once you get past that, though, you can view Internet usage for the previous hour, the entire day, and even for previous weeks or months.

LittleBrother Pro, Version 1.0. List price: For 1,000 users, \$10,495. Kansmen Corp., Milpitas, CA; 408-263-9881; fax, 408-263-9883; www.kansmen.com. Circle 951 on reader service card.

ON Technology Corp.

ON Guard Internet Manager

If you're more interested in monitoring your users' Internet usage than in extensive blocking, ON Guard Internet Manager, Version 2.5 (\$33,500 for 1,000 users), from ON Technology, is a product to consider. ON Guard, which is a special-



GUARD DUTY: Though not perfect, ON Guard will keep users from browsing a limited number of sites.

ized IP sniffer, lets you block access to FTP, Gopher, HTTP, and telnet sites that you deem inappropriate, but it doesn't come with a predefined site list, so you have to generate your own. And for reliable blocking, ON Guard requires that all clients whose access you're blocking be on the same network segment.

ON Guard is made up of the ON Guard server and ON Guard administrator programs. As with WebSense, the server program runs as a Microsoft Windows NT service and requires a Windows NT machine running either Windows NT Server or Workstation. The administrator can run on any Windows-based client PC, so you can use it without logging onto the server. Installation takes only a couple of minutes, and other than the time it takes to create the site list, ON Guard's configuration time is minimal.

ON Guard is similar to LittleBrother in that it sits on the network segment, sniffs every packet, and then logs the information in a database that contains the client PC's IP address and name, the destination URL—including the path—and the time of access. ON Guard records the source and destination of all network IP traffic and allows you to view this data in various report formats.

To create your own list of banned sites, you select from a list of previously visited sites, so you must visit a site before you can block it. ON Guard's site blocking isn't bulletproof. After we created a list of banned sites during testing, we attempted to visit them. The first time we made a request to visit a blocked page, most of it was returned. The second attempt was not as successful: We got only the text on the page and some of the background. On the third attempt, ON Guard returned a message that our connection to the host had been reset. From that point on, we were unable to access sites that we restricted.

SUMMARY OF FEATURES

Internet Usage Managers

■ YES ■ NO Products listed in alphabetical order	LittleBrother Pro	ON Guard Internet Manager	SmartFilter	SurfWatch ProServer	WebSense
List price per 1,000 users	\$10,495	\$33,500	\$7,000	\$3,500	\$4,795*
Supports Windows NT/ NetWare/Solaris	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Site Lists					
Number of sites in vendor-provided list	25,000	N/A	60,000	30,000	60,000
Number of categories	40	N/A	27	4	28
Updates posted	Quarterly	N/A	Weekly	Every two weeks	Daily
Editable lists/categories	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Monitoring and Blocking					
Monitors based on IP address/PC name	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Blocks based on IP addresses of one or more user workstations	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Blocks domain names and IP addresses of sites	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Logs user attempts to reach blocked sites	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Reports					
Reports by most used site/active user	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Overall usage	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Reports bandwidth utilization	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■

*Yearly fee for site-list updates; the software is free.

N/A—Not applicable: The product does not have this feature.

PC MAGAZINE
NETWORK EDITION
EDITOR'S CHOICE

The vendor admitted that during heavy-traffic conditions, some requests slip by and that once the database contains more than 3,000 sites, blocking fails.

ON Guard's true claim to fame is its monitoring and reporting capabilities. ON Guard shows you a list of top users, popular sites, and protocol usage based on an average or a particular time of day. You can create reports that list network usage by users and groups. The report, however, lists users only by IP address or domain name, and most network administrators don't provide domain names for all client PCs.

ON Guard Internet Manager, Version 2.5. List price: For 1,000 users, \$33,500. ON Technology Corp., Cambridge, MA; 617-374-1400; fax, 617-374-1433; www.on.com. Circle 952 on reader service card.

Secure Computing Corp., Web Tools Division

SmartFilter

Of the products in our roundup, SmartFilter 1.0 (\$7,000 for unlimited users), from Secure Computing Corp.'s Web Tools Division, is one of the most complicated to install and use. Though its blocking and logging features are fairly powerful, like SurfWatch it doesn't have native reporting capabilities. And though SmartFilter functions as a type of proxy server, unlike WebSense and SurfWatch—the other proxy server-based products we reviewed—it doesn't use two network interface cards (NICs), so to guarantee blocking you also need a firewall. If you already use a firewall from Secure Computing, SmartFilter may be a good choice; but if you want a cleaner interface and more functionality, consider one of the other products in this roundup. Secure Computing is aware of the prod-

Microsystems' List Among Lists

When examining our group of Internet-access managers, we focused primarily on user interface, ease of use, and blocking and monitoring capabilities. One of the most valuable components of these products, however, is the included—or missing—list of blocked sites. Unless you have the time and resources to search the Internet and enter hundreds if not thousands of objectionable locations manually, you'll want a product with a well-thought-out site list.

Though the latest version of CyberPatrol Corporate, from Microsystems Software, wasn't ready in time for our testing, it is the product to beat for site lists: It has one of the best and most widely used lists on the market. The uniquely compiled list contains approximately 20,000 FTP, Gopher, newsgroup, and Web sites—for a total of 3.4 million banned pages—and it is used by such ISP luminaries as AOL, AT&T, Bell Atlantic, CompuServe, and Prodigy.

Though anyone can create a list of objectionable sites, Microsystems' technique makes its list unique. Devel-

opers at Microsystems use a proprietary search engine called CyberSpyder to create the list. It scans as many as 200 sites per minute, using 8 different languages, to search for questionable word fragments. Site locations and all discovered fragments—along with characters directly in front and in back of them—are stored in a file. The files are then inspected, and if necessary sites are visited. When a site is deemed inappropriate, it is added to the blocked list. The sites are then divided into 13 categories, providing a list of sites inappropriate for a range of users, from children to corporate employees.

Every two months, the CyberPatrol developers invite a group of people from various interest groups—the NAACP, NOW, the NRA, and local schools and churches—to examine the list. If they believe a site does not belong on the list group members can petition for its removal. In addition, Microsystems works with different ISPs and Web designers to discover when the questionable content of a blocked site changes.—SR

uct's shortcomings and will offer an improved version later this year.

Installing SmartFilter is a complicated affair. We had to download the software, unzip the files, copy the files manually, and register the service and program with the Microsoft Windows NT registry. Although you can download documentation for guidance, we found some configuration commands confusing.

SmartFilter also has proxy-server problems. To prohibit access to restricted sites, most proxy servers require two NICs, one for the LAN and the other for the Internet connection. SmartFilter has only one NIC and connects only to the LAN; the program relies on the firewall for the Internet connection. If you don't have a firewall or another proxy server, a determined user can easily break this barricade by turning off the proxy-server implementation and going directly to the

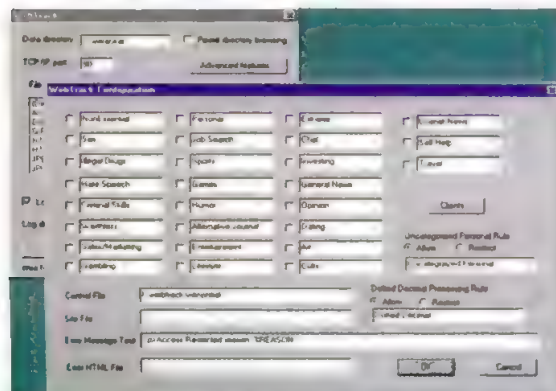
router for Internet access.

SmartFilter comes with a list of 60,000 objectionable sites in 27 categories. You can block access to FTP, Gopher, and HTTP services by individual user or by groups of IP addresses. To block individuals, you must know their IP addresses; you can deny or permit access to entire lists of IP addresses.

Denying and permitting access is straightforward via the control lists, but adding a new site is confusing; you must use a text editor and specific syntax to edit the site file.

Secure Computing claims that SmartFilter can block sites by both IP address and domain name, but on our tests we couldn't consistently block by IP address. And the only monitoring feature the product has is a log file, which merely lists the IP addresses of offenders and their HTTP requests. Lastly, you can't generate custom reports from the log files.

SmartFilter 1.0. List price: For unlimited users, \$7,000. Secure Computing Corp., Web Tools Division, Naples, FL; 941-261-5503; fax, 941-261-4425; www.smartfilter.com. Circle 953 on reader service card.



KEEP 'EM ON TRACK: SmartFilter, formerly WebTrack, includes 27 categories of sites you can block access to.



Seagate Desktop Management Suite™ gives you a mix that's *tops in its class.*

Now, Seagate Software offers a comprehensive suite of best-of-breed Windows NT-based management products that make your network obey.

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Seagate WinINSTALL – first 32-bit software distribution product to eliminate scripting

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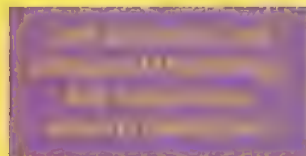
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Spyglass Inc.

SurfWatch ProServer

Although SurfWatch ProServer, from Spyglass, is one of the easiest products in this roundup to install and use, it has a couple of limitations. SurfWatch (\$3,500 for 1,000 users) has the fewest number of categories in its database—four—and it doesn't have any reporting capabilities. But what SurfWatch, which runs as a proxy server, does have is a unique technology called pattern matching. Instead of blocking an entire site, pattern matching blocks only the offending pages, and it even monitors your search strings to prevent access to a blocked site from a search engine.

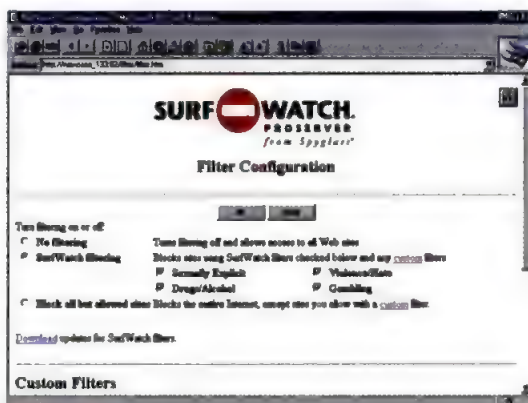
SurfWatch comes with a database of 30,000 sites divided into four categories; updates can be downloaded from Spyglass's Web site. In case you can't wait for updates, SurfWatch makes it easy to create your own list of allowed or blocked FTP, Gopher, and Web sites.

SurfWatch runs as a proxy server and connects to your network via two network adapters. The product not only blocks sites but caches commonly requested sites, which enhances network performance. The product is a snap to install; the only data you have to provide is the domain name and port information of your Windows NT server.

All configuration and administrative tasks in SurfWatch are performed with a Web browser. The interface is intuitive, and the manual and online help are useful. SurfWatch is extremely easy to navigate, and though you have to restart the server after each change the process takes only a few seconds. Unlike WebSense, SurfWatch doesn't run as a Windows NT service.

As they are in WebSense, Web sites in SurfWatch's database are blocked by both domain name and IP address. When we added Web sites to our custom blocked list, however, we couldn't add their IP addresses. When we tried entering the IP address of a Web site on the customized list, we could still access it. We could, however, add as many domain names as we wanted. Unlike with the rest of the products in this roundup, SurfWatch does not let you limit access based on the IP address of a user or group of users; you must block all users on the network.

SurfWatch provides the same basic logging capabilities as SmartFilter. Both products allow you to save such limited information as which IP addresses and domain names tried to access a site and when. Without using a third-party report generator, however, you can't generate reports.



WATCH OUT: Spyglass's SurfWatch provides only four categories for blocking Internet sites.

SurfWatch ProServer. List price: For 1,000 users, \$3,500. Spyglass Inc., Los Altos, CA; 415-948-9500; fax, 415-948-9577; www.surfwatch.com. Circle 954 on reader service card.

NetPartners Internet Solutions Inc.

WebSense

With its powerful database, detailed monitoring, and friendly interface, WebSense, Version 3.0, from NetPartners Internet Solutions, is the most powerful Internet access-control utility on the market. A true proxy server, WebSense provides both Internet monitoring and content blocking for Internet and intranet HTTP and NNTP traffic. But the real key to WebSense is its proprietary IP-screening technology, which blocks every site on WebSense's list by both IP address and domain name. Except for SurfWatch, the other products in this roundup block access by domain name only. The one downside to WebSense is that, like all proxy servers, it forces you to make specific adjustments to your clients' browsers.

You can download WebSense for free from NetPartners' Web site, but it has only 50 sites. To get the complete database of 60,000 sites in more than 28 categories and the automated daily updates, you must pay a yearly subscription fee (from \$495 for 25 users to \$6,995 for unlimited users). By the time you read this, WebSense's list will be part of CheckPoint Software Technologies' FireWall-1.

We didn't encounter any problems installing or using WebSense. Besides ON Guard Internet Manager, WebSense is the only product we reviewed that runs as a Windows NT service. WebSense logs all

activity to the Windows NT Event Log, though you must increase the Event Log's size to accommodate the extra information.

WebSense blocks the entire Internet by default. But once you implement the database, it's easy to adjust the blocking to suit your particular needs and add sites of your own. WebSense lets you add sites not included in its database by using the custom category. You can also block access to sites based on time of day, day of week, category, or client PC, or any combination of the

four. But unlike with LittleBrother, you must know the IP address of a client PC before you can block its access.

Though WebSense itself is a proxy server, it can sit on a machine with Microsoft's or Netscape's proxy servers, which means you can disable the proxy portion of WebSense, use the more powerful caching capabilities of the Microsoft or Netscape servers, and still have the blocking power of WebSense. WebSense provides proxies for most TCP and UDP services, including IRC, POP3, and Real Audio.

WebSense doesn't include a report utility, but NetPartners offers a free application—WebSense Reporter—that reads the Event Log and creates graphical re-

From Address	To Host	Total Hits
10.0.0.1	www.mcafee.com	1
10.0.0.1	www.mcafee.com	1
10.0.0.1	www.mcafee.com	1
10.0.0.1	www.mcafee.com	1
10.0.0.1	www.mcafee.com	1

From Address	To Host	Total Hits
10.0.0.1	www.mcafee.com	1
10.0.0.1	www.mcafee.com	1
10.0.0.1	www.mcafee.com	1
10.0.0.1	www.mcafee.com	1
10.0.0.1	www.mcafee.com	1

SENSE OF SURF: WebSense has full-featured blocking and reporting capabilities.

ports based on user-selected criteria. You can view destination sites, amount of traffic, and attempts to access blocked sites. The reporting is extensive, but WebSense Reporter doesn't provide real-time monitoring, alerts, or reports on usage by MAC address or machine name only. □

WebSense, Version 3.0. List price: Free; subscription fee: for unlimited users, \$6,995. NetPartners Internet Solutions Inc., San Diego; 619-505-3020; fax, 619-495-1950; www.netpart.com. Circle 955 on reader service card.

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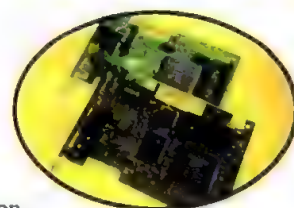
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First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

ISDN TERMINAL ADAPTERS

ISDN on the PCI Bus

By Les Freed

Until now, ISDN terminal adapters have come in two flavors: external units that connect to a serial or parallel interface, and ISA-bus internal adapters. Internal ISDN adapters have a performance advantage over their external counterparts (for more information, see "Digital Dragsters," February 4, 1997), but ISA cards can be difficult to install, especially in resource-crowded multimedia PCs.

Most PCs sold today are PCI-bus machines; PCI provides better Plug and Play support than ISA does. PCI cards can share IRQ lines, which helps to eliminate the most common installation problem with ISA cards. At last, ISDN adapters are beginning to enter the PCI space.

Two new products, from Eicon Technology Corp. and TigerJet Networks, bring ISDN into the PCI age. TigerJet's \$99 TigerJet 128K PCI ISDN Modem provides basic data-only ISDN at an all-time low price. Eicon's fuller-featured Diva Pro 2.0 costs approximately five times as much as the TigerJet, but it provides better performance and does double duty as an analog V.3 fax modem, too.

Eicon Technology Corp.

Div Pro 2.0

If you want an internal ISDN adapter and you could also use a fax modem, an analog modem, and excellent performance, then Eicon Technology Corp.'s Diva Pro 2.0 is for you.

The Diva Pro (\$549 with a U interface, or \$499 with an S/T interface) is a PCI-bus ISDN adapter card that does triple duty as an ISDN terminal adapter, V.32 analog modem, and V.29 analog fax modem. It also comes with an ISA bus. The adapter supports one or two POTS jacks through an optional, external POTS adapter box. The Diva Pro comes in four variations: with a PCI or

Pro yielded excellent throughput for compressed, moderately compressed, and noncompressible test files.

The Diva Pro package includes the Diva Pro card, an extra-long ISDN-line cord, a CD-ROM containing the Diva software, and three manuals—one each for Microsoft Windows 95, Windows NT, and Windows for Workgroups. The manuals are short and concise, and the CD-ROM contains an automated installer program that walks you through the software installation for all three platforms. The CD-ROM also

port, the software provides a virtual communications driver that allows you to access the Diva Pro through a virtual COM port. We were able to use the Diva to connect to a variety of dial-up modems and fax machines using Crosstalk for Windows, HyperTerminal, and Microsoft Fax.

Although the Diva's analog-modem emulation is a novel feature, most users will buy the Diva Pro for dial-up Internet/intranet access using PPP or Multilink PPP.

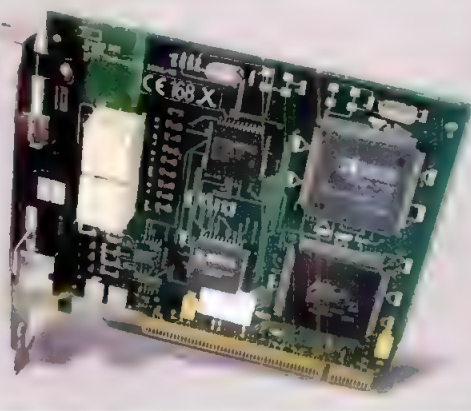
Div Pro 2.0. List price: With U interface, \$549; with S/T interface, \$499. Eicon Technology Corp., Montreal, Quebec, Canada; 800-803-4266, 514-745-5500; www.eicon.com. Circle 956 on reader service card.

TigerJet Networks Inc.

TigerJet 128K PCI ISDN Modem

In an industry dominated by slickly packaged and promoted products, TigerJet Networks' \$99 TigerJet 128K PCI ISDN Modem seems out of place. From its too-long name to the typos on the box and in the user manual to the company's direct-sales marketing tactics, the TigerJet looks like a product from the industry's early days. But the TigerJet provides capable, basic ISDN connections at a no-frills price. Your \$99 gets you a TigerJet board with a built-in U interface, two floppy disks, an ISDN-line cable, and a very slim manual. The TigerJet, however, does not have any POTS ports.

The board itself is very simple and compact, containing a single RJ-45 ISDN-line connector on the rear panel. There are only two chips on the TigerJet



PRO PERFORMANCE: The Diva Pro provides excellent throughput, along with analog and fax support.

ISA bus, with or without a built-in NT-1 interface. We tested the PCI version of the Diva Pro without the built-in NT-1 interface.

The Diva Pro's hardware uses a five-chip design, with a Siemens ISDN controller chip and a custom 133-MHz DSP chip. The chip allows the Diva Pro to perform the analog-to-digital conversion required for analog-modem emulation and to handle full-speed ISDN connections without placing any load on the PC's CPU. On our performance tests, the Diva

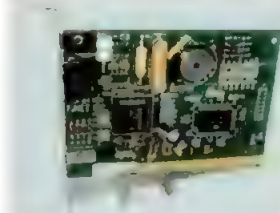
includes Adobe Acrobat Reader 3.0, Microsoft's ISDN Accelerator Pack 1.1 for Windows, and Internet Explorer 3.0, as well as complete product documentation in .PDF format.

It took us about 10 minutes to install the adapter, and we had it working correctly on the first try. The Diva Pro allows you to install several virtual modem drivers, including ones for a V.32 bis analog modem, a V.29 fax modem, and PPP, V.110, and V.120 ISDN terminal adapters. Although the Diva Pro doesn't use a COM

NETWORK EDITION

First Looks

board; one is a standard Siemens ISDN interface chip, and the other is TigerJet's custom controller chip. The TigerJet manual is full of typographical and grammatical errors, but a short READ.ME file on one of the floppy disks tells you all you



JET SPEED: TigerJet provides an economical ISDN TA.

need to know. The installation process is simple, and TigerJet provides drivers for Microsoft Windows 95 and Windows NT 4.0. Both versions of the drivers installed in a few minutes with no problems. You must provide the TigerJet installer with your ISDN phone numbers and

SPIDs, but the board determines the switch type.

The installation disks include a copy of Microsoft's ISDN Accelerator Pack for Windows 95 and a copy of the dated Internet Explorer 2.0. If you want an updated version of Internet Explorer, you'll have to download it yourself. But once you have 128-Kbps ISDN, you can download a copy of IE 3.0 in a few minutes.

Like most internal ISDN adapters, the TigerJet installs as an NDIS WAN driver under Windows 95 and Windows NT, and it uses Windows' built-in dial-up networking to place calls. The TigerJet drivers install the ISDN B-channels as separate devices, so you can place calls using either one or both of them. The TigerJet provides excellent ISDN connections.

We connected the TigerJet to an assortment of host routers, from Ascend Communications, Cisco Systems, and

CROSSTALK



Leon Erlanger

“What are the new 56-Kbps modems going to do to the market for ISDN adapters, Frank? Connections using 56-Kbps modems don't require up-front investments in new lines or carry high per-minute charges. I surfed the Web using a USR x2 modem with a 46-Kbps connection that seemed as good as a single ISDN 64-Kbps channel. Is the ISDN TA dead?”

“It seems that a 56-Kbps connection is an iffy thing. We found that only from 50 to 60 percent of residences can get a fast connection using the new technology. ISDN is reliable and better for bet-the-business applications, so the future is still bright for both of the ISDN TA products in this mini-roundup.”



Frank Dorfner

3Com Corp., all without a hitch. Like all internal ISDN adapters, the TigerJet can use the MS-Stac data compression built into Windows 95 and Windows NT.

The TigerJet's obvious shortcoming is its lack of POTS support. But what can you expect for \$99? If you need a simple, re-

liable ISDN connection for Internet or remote LAN access, the TigerJet may be for you.

TigerJet 128K PCI ISDN Modem. List price: \$99. TigerJet Network Inc., Cupertino, CA; 408-725-7506; fax, 408-257-6149; www.tigerjet.com. Circle 957 on reader service card.

MULTIPLE ACCESS By Steve Buehler

RoM. ROM? No, RoM.



The PC industry keeps taking the silicon from add-in cards and putting it on motherboards. Video and sound started the ball rolling, and since then we've seen SCSI and Ethernet built-in on many mainstream and business-oriented desktop PCs. Servers haven't fol-

lowed this trend as closely as desktops have, despite some significant advances. SCSI is built into the motherboards of many servers these days, and on-board networking—usually 10-Mbps Ethernet—is gaining in popularity. Many higher-end machine manufacturers, however, have resisted this trend. Most VARs and network administrators I talk to cite two main reasons: They want the flexibility to choose add-ins and peripherals that best suit their needs, and they want to be able to upgrade and redistribute parts (and technologies) where needed as technology changes.

This trend may be changing, driven by the use of Intel i960 chips for such specific solutions as networks and RAID controllers. The i960s showed up recently in our Labs in Matrox's Piranha and Shark products (www.matrox.com), and we saw intelligent use of the i960's capacity. The Piranha is a switching



NIC that makes it easy to segment your network using only one PCI slot. The Shark is a 10/100 multiport card that takes advantage of the i960 for fast processing and queuing.

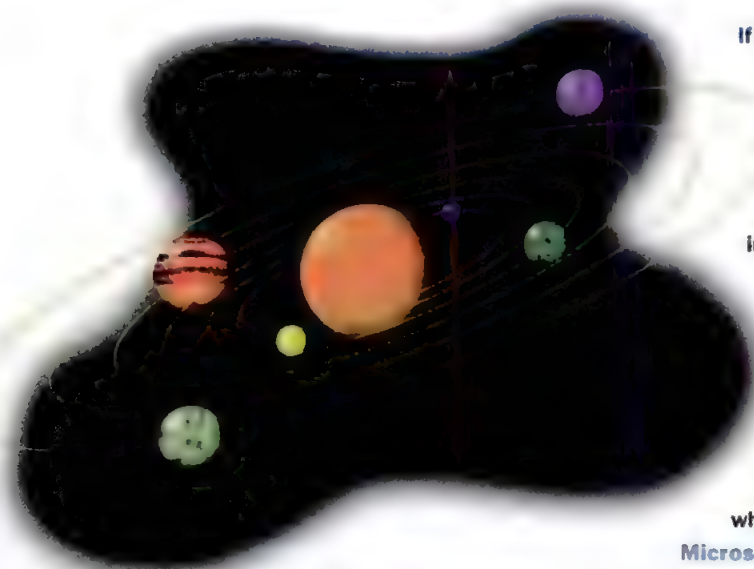
A new product from American Megatrends (www.ami.com), the BIOS manufacturer, also shows intelligent use of the i960. AMI has announced its MegaRAID on the Motherboard strategy, code-named RoM. By putting RAID on the motherboard, AMI hopes to get vendors to standardize their solutions. AMI may be able to overcome the all-in-one resistance because its RAID solution should work in clustered environments, allowing shared RAID access from clustered servers (see www.megaraid.com for more details). This means that clustering will be a viable candidate for server buyers who are concerned about setting up can't-fail environments.

The clustering solutions that many people will implement in the next two years will be packaged solutions, and having an all-in-one box with no additional purchases needed—the drop-in cluster—will be a compelling option for savvy network administrators. Note, though, that this still isn't a solution for everyone. The reasons listed above—lack of flexibility and ability to change technologies—will make many network admins cautious in their adoption of motherboard-based technology solutions. Smart buyers, however, should see this as one of those slower-moving trends that should nonetheless be on their radar when they plan their two- and three-year capital budgets.

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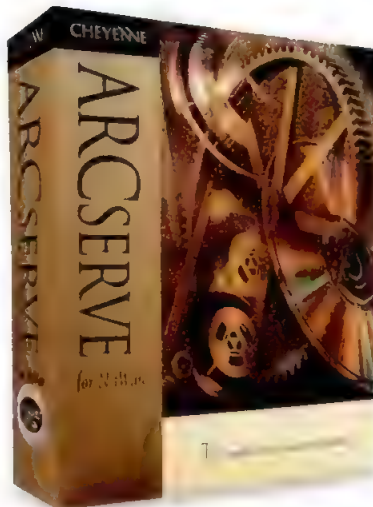
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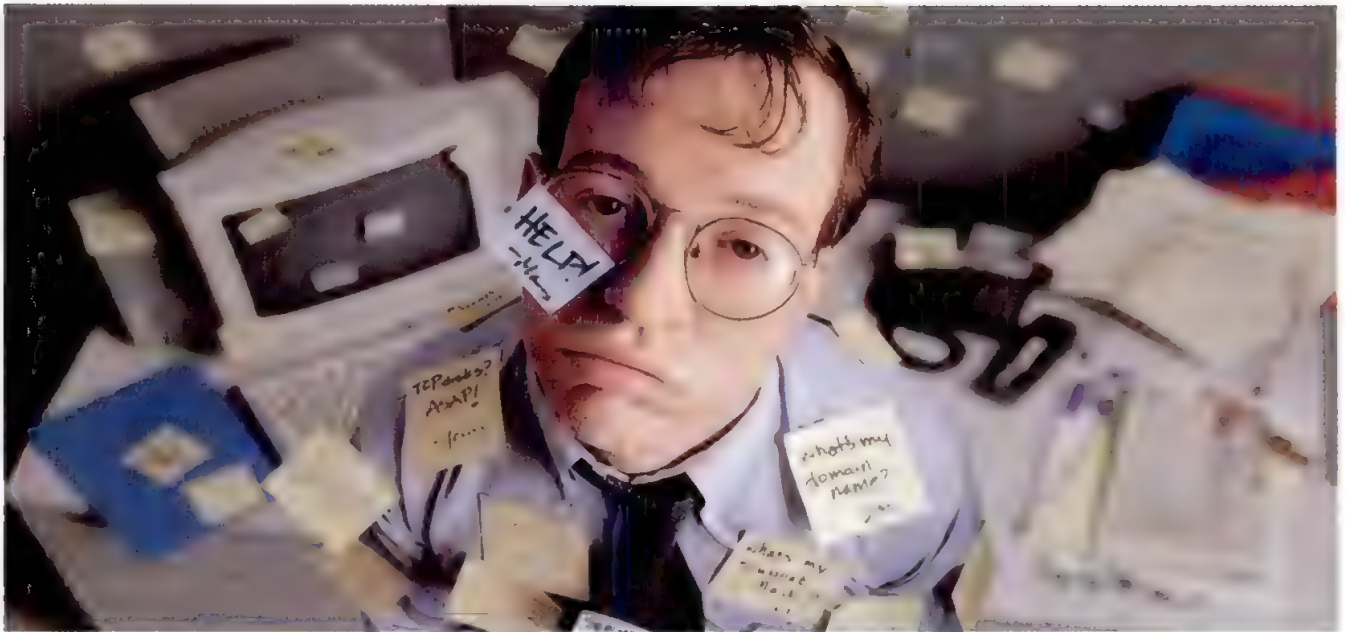
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CIRCLE 153 ON READER SERVICE CARD

top 100 hardware accessories



Better ways to mouse, as with Gyration's Gyro-Point.

Personal computer, monitor, network card, printer, software. What more do you need in order to get the job done? We can think of a hundred things: hardware accessories that help you to do your job faster, better, smarter, and with style.

For instance, you have at least one mouse pad, maybe a couple. At *PC Magazine*, we've seen hundreds of mouse pads, and we've found one standalone product for incredibly precise mouse tracking, plus another couple of pads that are—well, just plain fun.

For this article, we selected the 100 best hardware accessories in 11 categories: essential upgrades, must-haves for the PC junkie, aids for the road warrior, presentation tools, ergonomics, keyboards and input devices, power and input/output enhancements, printing solutions, kid stuff, gaming devices, and organizational tools. These selections are



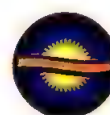
Five Essential Upgrades

You don't have to settle for what came in the box with your PC.102



Work in Comfort

Create a more healthful environment with ten ergonomic essentials.....114



Power and Control

Take care of all your PC connections with these ten products.....120



A Baker's Dozen for the PC Junkie

These 13 products prove that the PC is more than just a glorified typewriter...113



Better Mice and Keyboards

Here's a range of input devices tailored to special needs.118



Hard-Copy Helpers

Put your printer to work for you.123

THE ESSENTIAL. THE OVERLOOKED. THE JUST PLAIN FUN.

HERE ARE 100 OF OUR FAVORITE ADD-ONS.

By Bill Howard

are series

Better ways to point,
as with the Synaptics
E-Z Point.



based on the personal experience and the hands-on use of PC Magazine editors and contributors. We brought many of the products into *PC Magazine* Labs to verify our subjective experiences with them.

Products run the gamut from that precision mouse pad to a wireless mouse for presenters, from space-saving CD storage to an adapter for plugging wide transformers into power strips without losing any outlets, and from three great laptop bags to a gizmo that lets you connect an adult mouse and a kid mouse to a single mouse port.

Just as a further note: In some instances, where two competing products do essentially the same job, we mention them both. But there are other instances in which the field includes half a dozen similar products; then we choose only one example. You may be able to find an equally good product from another vendor, depending on where you go shopping.

If you believe in the motto "He who dies with the most toys wins," read on.



Better ways to
connect, as with a
portable printer
cable.



Gamer's Heaven

If the keyboard isn't cutting it, consider these game controllers.124



Keep It Neat

These affordable add-ons organize the clutter a PC brings with it.136



Kid Stuff

Give your kids a head start in the PC arena.....133

More Places to Look

Essential catalogs103

Gadgets to Go Special pullout section of essential tools for road warriors and presenters.106

How to Contact the Vendors......130



Join Us Online

Visit the interactive version of our top 100 hardware accessories.

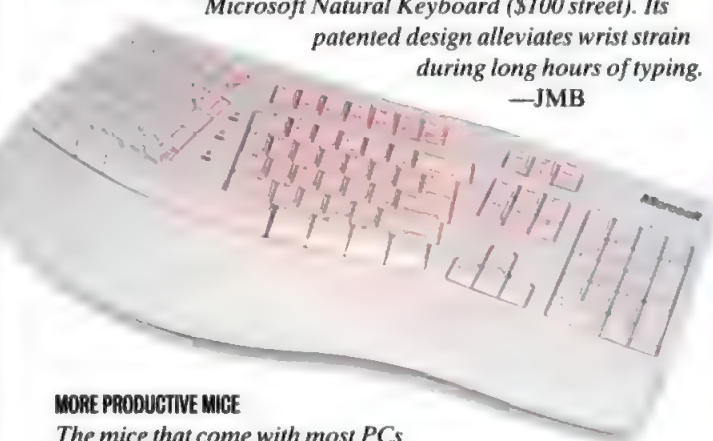
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5 essential upgrades

You don't have to settle for what came in the box with your PC. Here are accessories that everyone should consider.

COMFORTABLE KEYING The traditional keyboard is an ergonomic nightmare that forces your hands and wrists into unnatural positions. The best replacement keyboard we've found is the Microsoft Natural Keyboard (\$100 street). Its patented design alleviates wrist strain during long hours of typing.
—JMB



MORE PRODUCTIVE MICE

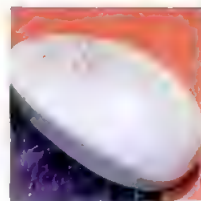
The mice that come with most PCs are often the cheapest money can buy. But there are mice that feel better and make you more productive. To optimize navigating through your system, try Microsoft's IntelliMouse (\$85 street). It features a rubber wheel located between the two mouse buttons that facilitates scrolling through IntelliMouse-enabled applications such as Microsoft's Office 97 and Internet Explorer 3.0.

Kensington's Thinking Mouse (\$60 street) is the best use of the programmable mouse we've seen. You can customize its four buttons to perform a range of keystroke functions with a single click.

If you haven't given much thought to your mouse pad, think



again. 3M, the folks who brought us Scotch tape and Post-It notes, have another innovation in store: the Precise Mousing Surface (\$15 street). The thin vinyl pad's surface gives you greater cursor control with less wasted rolling. You'll notice the difference.—MJP and TK

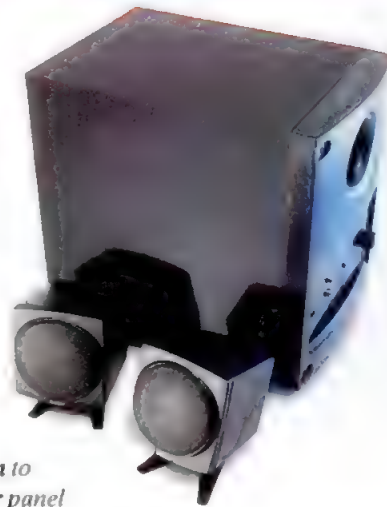


A SOUND EXPERIENCE If you're serious about multimedia, you need to chuck the courtesy speakers that came with your PC and



upgrade to better ones. For gaming, the surround-sound feature and impressive subwoofer made Altec Lansing's ACS55 (above right; \$200 street) the hands-down favorite of our listening panel. If you want a more affordable upgrade, consider Altec Lansing's ACS45 system (above left; \$100 street), which provides comparable sound but no external controls.

If you use your PC speakers primarily to listen to music while you work, our panel recommends the Boston Acoustics MicroMedia Speaker System (right; \$250 street) for home-stereo sound quality.—CE and DRL



Our Contributors: BILL HOWARD is the executive editor responsible for hardware at *PC Magazine*. TONI KISTNER is a staff editor for the hardware peripherals team, and MICHAEL N. RUSIGNUOLO is the editorial researcher. Special thanks to the other *PC Magazine* staff members who contributed to this report: DIANE D'ANGELO, CRAIG ELLISON, BRETT KRASNOVE, DAVID R. LAMBERT, JOSH LEVY, CADE METZ, JAY MUNRO, MELISSA J. PERENSON, ALFRED POOR, MICHAEL E. RYAN, and DENIS TOM. JAMIE M. BSALES was the associate editor in charge of this story.

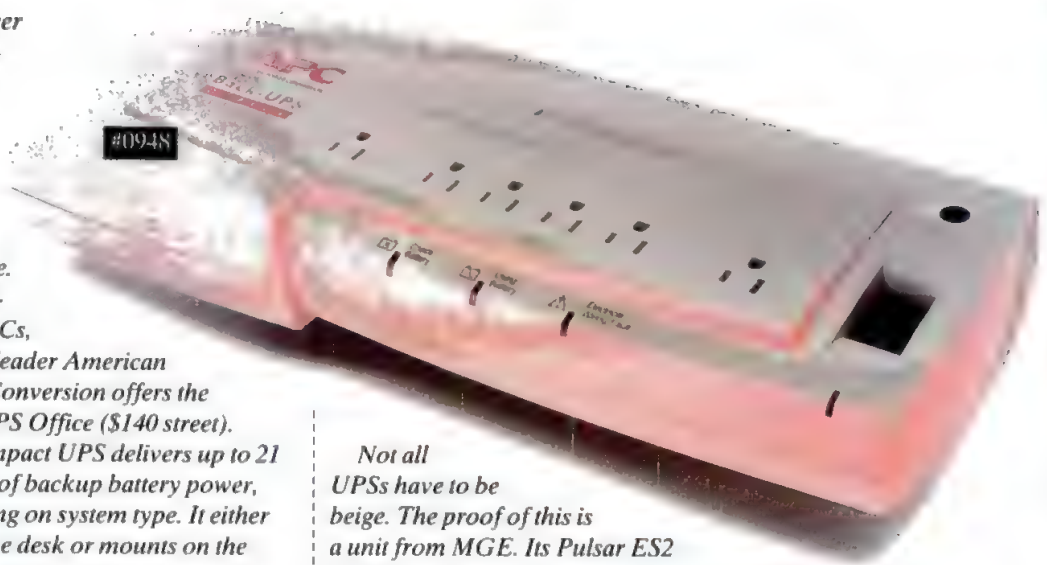
MOST OVERLOOKED ACCESSORY

Most of us don't worry about a power outage bringing down our system—until it happens. You should connect your PC to one of the many good uninterruptible power supplies (UPSs) on the market, especially if you work at home, where the power source may be less reliable than at the office.

For individual PCs, market-leader American Power Conversion offers the Back-UPS Office (\$140 street). This compact UPS delivers up to 21 minutes of backup battery power, depending on system type. It either sits on the desk or mounts on the wall, and it contains three battery-powered outlets that kick in if the lights go out, three surge-protected outlets, and a phone-line protector. There's even an alarm that sounds when the battery is undercharged or

the UPS is overloaded. SL Waber's UPStart Uninterruptible Power Supply (\$200 street) delivers up to 5

minutes of backup power and features Electronic Bookmark software that automatically saves data, closes open files, and initiates a safe shutdown. The flat UPS sits unobtrusively under the monitor and has two battery-powered outlets, three auxiliary outlets, a phone-line protector, and a power-failure alarm.



Not all UPSs have to be beige. The proof of this is a unit from MGE. Its Pulsar ES2 (\$100 street) is chic, affordable, and versatile. It can sit either upright or beneath the monitor and offers two battery-powered outlets and 20 minutes of backup. —TK

MORE PLACES TO LOOK

If you didn't find the particular gadget or gizmo you were looking for, it's probably out there somewhere. These companies have catalogs and Web sites chock full of nifty hardware accessories—more than we could possibly include in this story. They are worth a visit.

Allsop Inc.

SPECIALTY: storage aids, other PC accessories;
800-428-4303;
www.allsop.com.

Case Logic.

SPECIALTY: hardware and media cases;
800-447-4848;
www.casellogic.com.

Fellowes Manufacturing Co.

SPECIALTY: ergonomic aids, mouse pads, wrist rests, more;
800-845-4545;
www.fellowes.com.

Hello Direct Inc.

SPECIALTY: telecommunications accessories;
800-444-3556;
www.hello-direct.com.

Kensington Microware Ltd.

SPECIALTY: input devices, hardware and media cases, power accessories, more;
800-535-4242;
www.kensington.com.

Konexx.

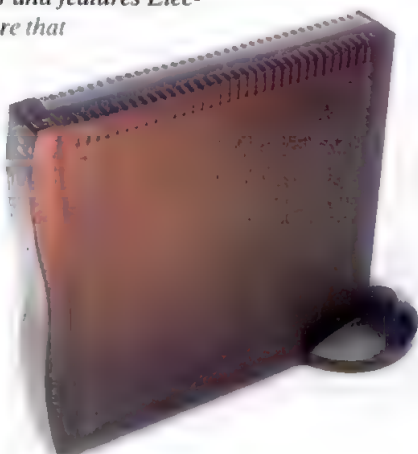
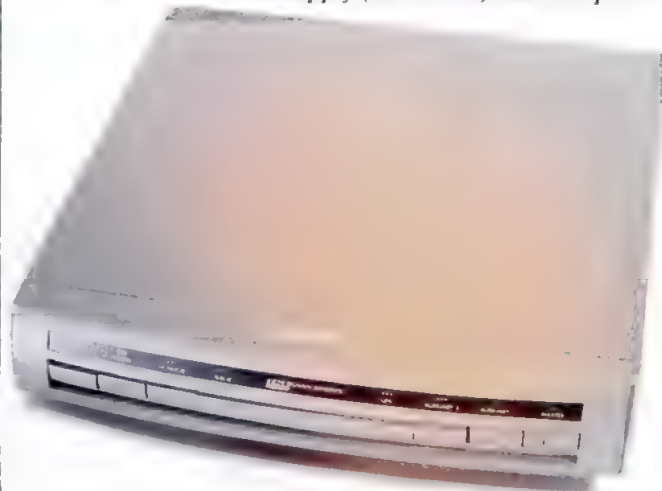
SPECIALTY: communications accessories, more;
800-275-6354;
www.konexx.com.

Rubbermaid Office Products Inc.

SPECIALTY: storage products, desk and office accessories, more;
800-827-5055;
www.rubbermaid.com.

Steelcase Inc.

SPECIALTY: PC furniture, desk and office accessories;
800-227-2980;
www.steelcase.com.



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& presenter's toolkit

When you're hopping from city to city, your notebook PC can be your lifeline. It all depends on what you pack. This cache of 20 gems will help you find your way, plug in and hook up in foreign lands, turn a rental car into a rolling office, keep your laptop from walking away, and tote along everything you need.

If making presentations is a common occurrence when you travel for business, you'll need special tools to help get your point across. We steer you toward seven products that no presenter should leave home without.





presenter's toolkit

Tools for taking your show on the road.

BEST LAPTOP REMOTES Any laptop remote control will take getting used to, but the most intuitive and easy-to-use infrared devices we tested are Varatouch Technology's *I-Point* and *TracPro* (\$160 street each). Pick the one you prefer: The *I-Point* uses a joystick and the *TracPro* uses a trackball to deliver fine control over cursor movement. To make your point on-screen, each emits a laser beam that can cast a bright red dot on surfaces up to 500 feet away. If you're just running a PC-based slide show, consider Varatouch's less expensive *ProPresenter* (\$80 street), a comfortable wireless control with forward and reverse buttons.



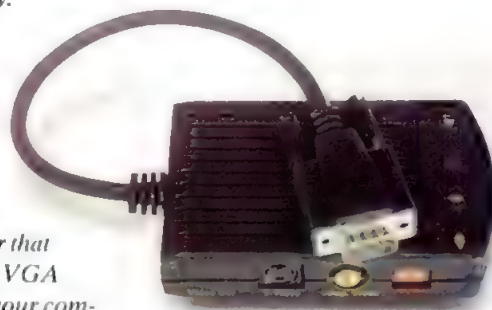
ADD PANACHE TO PRESENTATIONS Mind Path Technologies' *Remote Control* and *Wireless Keyboard* (\$100 street each) also give you control over your laptop from across the room, but they include software that lets you add flashy



enhancements and lighting effects such as zooms, spotlights, and highlighting. The hand-held remote features a disk-shaped cursor controller and programmable buttons; the infrared keyboard is small enough to slip into your laptop bag.

NO MONITOR NEEDED Most conference rooms don't have a PC monitor, but there is often a television handy.

The *TV View Micro Presenter Plus* (\$200 street), from *Focus Enhancements*, is a scan converter that lets you display VGA graphics from your computer onto a TV. Bonus: At home, you can use the 7-ounce external scan converter to play computer games on your home theater.



CLIP-ON SPEAKERS If you need better sound quality from your multimedia notebook but don't want to lug large speakers around with you, add the lightweight *Jazz J-SP30* portable speakers, from *Jazz Multimedia* (\$50 street). They clip onto your laptop's screen and run off AC power or 2 AA batteries. If you're looking for more serious sound, turn to *Cambridge SoundWorks' SoundWorks* (\$220 street), a three-piece speaker system that delivers home-stereo-quality sound.



Contacting the Vendors

a2z Mobile Office Solutions Inc.,
Point of Rocks, MD; 800-347-6222, 301-831-8828;
www.a2zsolutions.com.

Cambridge SoundWorks Inc.,
Newton, MA; 800-367-4434, 617-332-5936;
www.hifi.com.

Case Logic,
Longmont, CO; 800-447-4848, 303-530-3800;
www.casellogic.com.

DeLorme Mapping,
Freeport, ME; 800-452-5931, 207-865-1234;
www.delorme.com.

Fellowes Manufacturing Co.,
Itasca, IL; 800-945-4545, 630-893-1800;
www.fellowes.com.

Focus Enhancements Inc.,
Sudbury, MA; 800-775-5566, 508-371-2000;
www.focusinfo.com.

Jazz Multimedia Inc.,
Industry, CA; 818-336-2689;
www.jazzspeakers.com.

Kensington Microware Ltd.,
San Mateo, CA; 800-535-4242, 415-327-7900;
www.kensington.com.

Levenger,
Delray Beach, FL; 800-544-0880, 561-276-4141;
www.levenger.com.

Mind Path Technologies Inc.,
Dallas, TX; 800-449-1899, 972-233-9296;
www.mindpath.com.

Port Inc.,
Norwalk, CT; 800-242-3133, 203-866-0221;
www.port.com.

Road Warrior International,
Fountain Valley, CA; 800-274-4277, 714-418-1400;
warrior.com.

Server Technology Inc.,
Sunnyvale, CA; 800-835-1575, 408-745-0300;
www.servertech.com.

Statpower Technologies Corp.,
Burnaby, BC, Canada; 800-994-7828, 604-420-1585;
www.statpower.com.

Tenba Quality Cases,
New York; 212-966-1013;
www.tenba.com.

Tumi,
Middlesex, NJ; 800-299-8864, 908-271-9500;
fax, 908-271-8197.

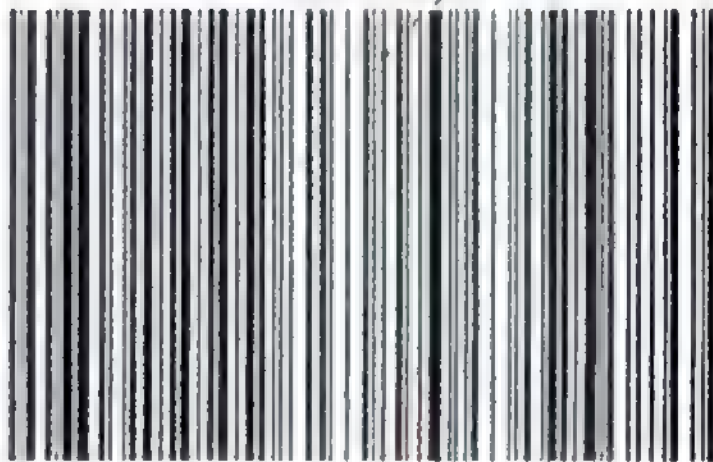
Varatouch Technology Inc.,
Sacramento, CA; 800-888-9281, 916-331-6300;
www.varatouch.com.

—Product reviews by Jamie M. Bsates, Bill Howard, Toni Kistner, Brett Krasnowe, and Michael N. Rusignuolo.

1. Follow instructions on the other side

Back

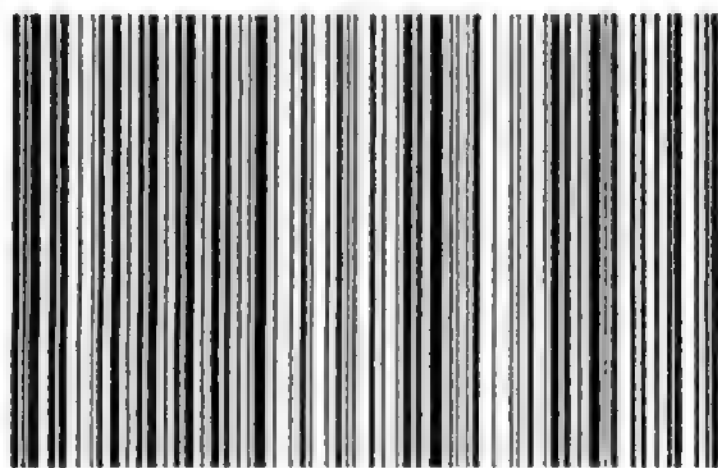
GB551PBack-0018



Inverted Back

1. Follow instructions on the other side

Folded edge of the page



GbsSlipSheet-001

Inverted Foldout slip-sheet

1. Open the foldout page

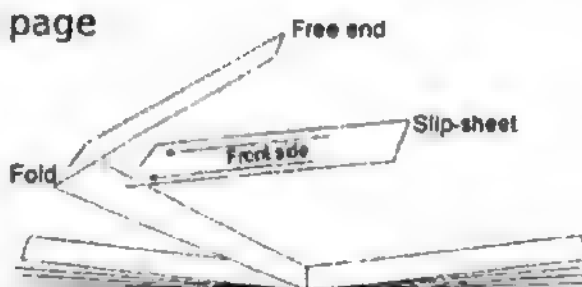
2. Insert this sheet with

1. Front side touching the free page

2. Arrow pointing to the fold

3. Slice the folded edge

4. Close the page and slip-sheet



1. Open the foldout page

2. Insert this sheet with

1. Front side touching the free page

2. Arrow pointing to the fold

3. Slice the folded edge

4. Close the page and slip-sheet



the plane, and it even works well as a tethered PC control for presenters. And it's comforting to have along should your laptop's pointer die mid-trip.

WAKE-UP CALL Ever try dialing into a computer via modem only to find that the computer is turned off or that the system has locked up? Server Technology's Remote Power On/Off '95 (\$130 street) can help by letting you power up or reboot the system remotely. It even lets you power up a fax or answering machine.



DON'T FRY YOUR MODEM Digital phone jacks that pump too much juice lie in wait for the unsuspecting traveler. Before plugging into that inscrutable outlet, get the green light from Road Warrior International's Modem Saver (\$50 street).



PLUG IN WITH IMPUNITY If globe trotting is just business as usual for you, get Road Warrior's Tele-TravelKit International (\$220 street). This sturdy nylon travel pack contains an assortment of international power plugs,



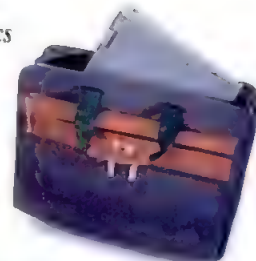
telephone adapters and connectors, a telecoupler, ribbon parallel printer cable, screwdriver, flashlight with magnifier, and 14-foot telephone cord.

ENOUGH CORD Carrying a length of telephone cord to reach from the phone jack by the bed to the table across the room is usually a tangled affair. Enter the SureLink Retractable Telephone Cord (\$15 street), from Port, which keeps 8 feet of phone extension cord in a neat, beeper-size case.



MAXIMUM PROTECTION If you've ever dropped and broken a laptop even though it was in its carrying case, consider the maximum protection offered by laptop bags from Port, such as the Sport Classic (\$149 list). Port uses

chamber-inside-a-chamber air sacs that resemble see-through, hot-dog-shaped balloons to cushion any sudden drops.



MAXIMUM CARRYING COMFORT Of the many backpack bags, the most rugged we've found come from Tenba, best known for long-lived photographers' bags. If the load you carry is too heavy for a shoulder bag, consider distributing the weight more evenly with the Backpack Scholar (\$190 list). Don't want to give up your stylish shoulder bag? Tenba also sells a \$30 kit to add a detachable backpack harness to any shoulder bag.



MAXIMUM DURABILITY Few bags cost more, but few bags last longer than Tumi's nylon shoulder bags. The newly redesigned Tumi Soft-Case Slim Organizer ComputerBrief (\$275 list), successor to the venerable Model 283, adopts the elastic antishock sling formerly used in Port bags. At 12 by 17 inches, it's big enough to carry your laptop, accessories, and paperwork. Users looking for a slightly larger bag should consider the Tumi SoftCase Deluxe ComputerBrief (\$325 list) instead.

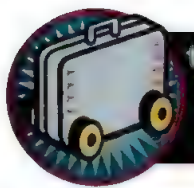


TOUGH AND FULL OF ZIPPERS Built for toting both Zip drives and CD players is the PDC-1 Portable Drive Case (\$20 street), from Case Logic. This compact, thickly padded nylon bag features a main pocket with a Velcro divider; a pocket for cords, adapters, and spare batteries; and a roomy front pocket for media.

The ZDK-8 Data Disk Case (\$11 street), from Case Logic, is a padded nylon zipper case that holds up to 8 CD-ROMs, floppy disks, or Zip disks in four see-through



pockets. We also like the CD Wetsuit from Kensington Sports (\$10 street). The lightweight wallet can hold 20 CDs and is made of neoprene—the same stuff surfers wear. Just don't hit the waves; the case isn't waterproof.



the road warrior's arsenal

Tools for the mobile professional.

KNOW YOUR PLACE If you spend a lot of your time on the side of the road fumbling with maps, it's time you had your own



GPS (global positioning satellite) system. DeLorme Mapping provides affordable GPS navigation with Tripmate (\$150 street). A dash-board-mounted receiver feeds your location (within a few car lengths) to

your notebook. The included CD-ROM Street Atlas USA 4.0 maps and then displays your car's real-time location.

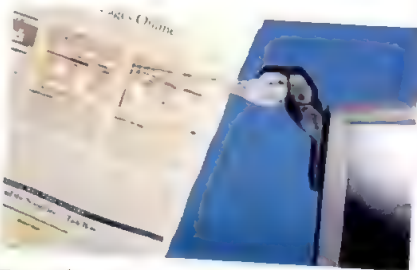
GOT A LIGHT? So you won't run down your laptop's battery while you navigate, add Statpower Technologies Corp.'s NOTE-

power 75 DC-to-AC Power Inverter (\$80 street). It lets you power up your notebook (or other electronic device) with 75 watts of AC power from your car's cigarette lighter.



HOLD THIS FOR ME Most airline tray tables just aren't big enough for your PC and the piece of paper your speech is

jotted down on. Enter the Laptop Copy Grip (\$4 street), from Fellowes Manufacturing Co. It attaches to your laptop screen via adhesive and swivels in all directions for perfect paper positioning while you type.



THE CLUB FOR YOUR PC Would you leave \$3,000 sitting in the open in your hotel room? Most of us do at some point—our laptops. Guard against thieves by attaching the Kensington Micro Saver Security lock (\$45 street)—better known as the "Kensington Lock." The tough metal cable attaches to your laptop's built-in receptacle (you can



retrofit laptops or other devices that don't have one with the included hardware) and loops around any immovable object, making your PC a less attractive target.

...AND THE ALARM For even more security, add the DefCon 1 Notebook Computer Security System (\$50 street), from Port. Powered by one 9-volt battery, its motion sensor sets off a loud, 110-decibel alarm if someone picks up your laptop.



BRING YOUR OWN You can always ask to connect to a printer in the office you're visiting, but ask the guy to disconnect his printer cable from the (often-inaccessible) back of his PC and you're starting to impose. So throw a short parallel cable into your bag. A 3-foot cable (\$12 at most computer stores) doesn't take up much room, and it could save you from losing a client.



GET COMFORTABLE

Tired of using your knees as a desktop when you're stuck in an airport or auditorium? a2z Mobile Office Solutions offers relief with the LapLeaf (\$30 street). The lightweight, collapsible desk slips easily into a notebook case. A larger, more luxurious (though less mobile) solution is Levenger's Lap Desk (\$40 street). Its cherry-wood surface is both sturdy and light; it has straps to secure papers and a stand to hold the desk when it's not in use.



UNDER YOUR THUMB

The integrated pointing devices on laptops have improved over the years, but Fellowes' Thumbelina (\$40 street) is still better than most. The diminutive trackball is unobtrusive when you're in the center seat on



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- Velocity 3D Video with 4MB VRAM
- Toshiba 12X EIDE CD-ROM Drive
- Cardinal 33.6Kbps Fax/Modem
- Altec-Lansing® Stereo Speakers
- 17" (15.8" viewable) .28 Pitch Monitor
- HP DeskJet 870 CXI Printer
- APC Pro SurgeArrest Pro71
- Microsoft® Windows® 95
- Corel® Application Suite
- MMX™ Software Package
- Maximizer® 3.0is
- 3 Year Limited Warranty with 1 Year On-Site



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Business Lease for \$100/mo

E165F

features

- Midtower or Desktop Chassis
- ZIF Socket 7 for Processor Upgrade
- Intel 430TX PCIset
- Flashable Award BIOS
- Intel PIIX4 PCI-ISA-IDE Xcellerator
- DMA/33 Support
- 7 expansion slots—3 ISA, 3 PCI, 1 shared PCI/ISA
- Two 5.25" drive bays exposed, two 3.5" drive bays exposed, one 3.5" internal drive bay
- Three 168-pin DIMM Sockets
- SDRAM Memory
- Two USB Ports
- DMI 2.0 with Hardware Monitors & Onboard Management Controller
- 512K Pipelined Burst Cache
- Creative Labs ViBRA 16CL with 3D



performance 200tx

- 200MHz Intel Pentium® Processor with MMX™ technology
- 32MB SDRAM Memory, Expand to 256MB
- 2.5GB EIDE Mode 4 Hard Drive
- Velocity 3D Video with 4MB VRAM
- Toshiba 12X EIDE CD-ROM Drive
- Cardinal 33.6Kbps Fax/Modem
- Altec-Lansing® Stereo Speakers
- 17" (15.8" viewable) .28 Pitch Monitor
- Visioneer PaperPort mx
- APC Pro SurgeArrest Pro71
- Microsoft® Windows® 95
- Microsoft® Publisher® 97
- Corel® Application Suite
- MMX™ Software Package
- Maximizer® 3.0is
- 3 Year Limited Warranty with 1 Year On-Site

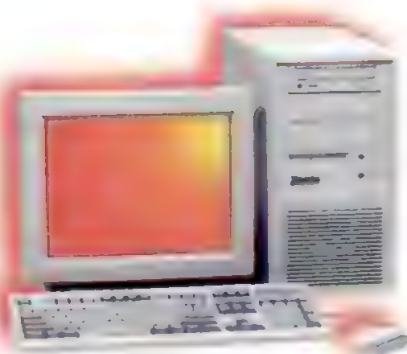


\$2999

Business Lease for \$104/mo

E205F

professional pro



performance pro 200s

- 200MHz Intel Pentium® Pro Processor
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- 256K L2 Cache
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- Velocity 3D Video with 4MB VRAM
- Toshiba 12X EIDE CD-ROM Drive
- 33.6Kbps Fax/Modem
- Integrated Creative Labs Audio
- Two USB Ports
- 17" (15.8" Viewable) .28 Pitch Monitor
- DMI 2.0 with Hardware Monitors & Onboard Management controller
- HP DeskJet 870CXI
- APC Pro SurgeArrest Pro71
- Microsoft® Windows® NT 4.0
- ProComm Plus 95
- Maximizer® 3.0is
- Office Application Suite
- 3 Year Limited Warranty with 1 Year On-Site

\$3599

Business Lease for \$125/mo

R205FH

performance pro 200

- 200MHz Intel Pentium® Pro Processor
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- 256K L2 Cache
- 3GB EIDE Mode 4 Hard Drive
- Travan 800MB Tape Backup
- Velocity 3D Video with 4MB VRAM
- Toshiba 12X EIDE CD-ROM Drive
- 33.6Kbps Fax/Modem
- Ensoniq Vivo 90 Wavetable Sound Card
- Altec Lansing® Stereo Speakers
- Two USB Ports
- 17" (15.8" Viewable) .28 Pitch Monitor
- DMI 2.0 with Hardware Monitors & Onboard Management controller
- Visioneer PaperPort mx
- APC Pro SurgeArrest Pro71
- Microsoft® Windows® NT 4.0
- Microsoft® Publisher® 97
- ProComm Plus 95
- Web Compass 2.0
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- Office Application Suite
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R205GH

notebooks

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- Built-in Stereo Speakers and Microphone
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- High Speed PCI bus
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- TrackPad Pointing Device
- PC Card Slots (2 Type II or 1 Type III)
- NiMH Battery
- 1 Year Limited Warranty plus Ultra-Care®

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V2630CD

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- 150MHz Intel Pentium® Processor with MMX™ Technology
- 12.1" Active Matrix with 1024x768 Color Display
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- Removable 1.4GB Hard Drive
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- 16-bit Stereo Sound
- Built-in Stereo Speakers and Microphone
- Full-screen MPEG Video Support
- High Speed PCI bus
- Infrared IrDA Port
- TrackPad Pointing Device
- PC Card Slots (2 Type II or 1 Type III)
- NiMH Battery
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V2650CDT



multimedia

performance 166x

- 166MHz Intel Pentium® Processor
- 32MB EDO Memory, Expand to 256MB
- 2.5GB EIDE Mode 4 Hard Drive
- Velocity 3D Video with 4MB VRAM
- Toshiba 12X EIDE CD-ROM Drive
- Iomega Zip 100
- Ensoniq Vivo 90 Wavetable Sound Card
- Cardinal 33.6Kbps FAX/Modem
- Altec-Lansing® Stereo Speakers
- Microphone and Stereo Headphones
- 17" (15.8" viewable) 28 Pitch Monitor
- APC Pro SurgeArrest Pro7T
- Microsoft® Windows® 95
- Corel® Application Suite
- Microsoft® Encarta®
- Streets and Phone Search Software
- ProComm Plus 95
- Maximizer® 3.0is
- 3 Year Limited Warranty with 1 Year On-Site

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Business Lease for \$93/mo

F165FCM

performance 200x

- 200MHz Intel Pentium® Processor with MMX™ Technology
- 32MB EDO Memory, Expand to 256MB
- 2.5GB EIDE Mode 4 Hard Drive
- Velocity 3D Video with 4MB VRAM
- Toshiba 12X EIDE CD-ROM Drive
- Ensoniq Vivo 90 Wavetable Sound Card
- Cardinal 33.6Kbps Fax/Modem
- Microphone and Stereo Headphones
- Altec-Lansing® Stereo Speakers
- 17" (15.8" viewable) 28 Pitch Monitor
- Visioneer PaperPort™
- APC Pro SurgeArrest Pro7T
- Microsoft® Windows® 95
- Corel® Application Suite
- Microsoft® Publisher® 97
- Microsoft® Encarta®
- Web Compass 2.0
- Maximizer® 3.0is
- MMX™ Software Package
- 3 Year Limited Warranty with 1 Year On-Site

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Business Lease for \$111/mo

F205FCM

performance 200xx

- 200MHz Intel Pentium® Processor with MMX™ Technology
- 32MB EDO Memory, Expand to 256MB
- 3GB EIDE Mode 4 Hard Drive
- 800MB Travan Tape Backup
- 3Com Fast Etherlink 10/100 BTX XL PCI
- Velocity 3D Video with 4MB VRAM
- Toshiba 12X EIDE CD-ROM Drive
- Ensoniq Vivo 90 Wavetable Sound Card
- Cardinal 33.6Kbps Fax/Modem
- Microphone and Stereo Headphones
- Altec-Lansing® Stereo Speakers
- 17" (15.8" viewable) 28 Pitch Monitor
- Visioneer PaperPort™
- APC Pro SurgeArrest Pro7T
- Microsoft® Windows® 95
- Corel® Application Suite
- Microsoft® Publisher® 97
- Microsoft® Encarta®
- Web Compass 2.0
- Maximizer® 3.0is
- MMX™ Software Package
- 3 Year Limited Warranty with 1 Year On-Site

\$3499

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F205GCM

features

- ZIF Socket 7 for Processor Upgrade
- Intel 430HX PCIsset
- Flashable Award BIOS
- Intel PIIX4 PCI-ISA-IDE Xcellerator
- 7 expansion slots - 3 ISA, 3 PCI, 1 shared PCI/ISA
- 3 5.25" drive bays exposed, 1 3.5" drive bay exposed, 2 3.5" Internal drive bays
- Four 72-pin SIMM Sockets
- 512K Pipelined Burst Cache

software/warranty

mmx™ software package

MMX™ Software Package includes POD, The Ultimate Human Body, The Third Dimension

corel® application suite

The Corel® Application Suite includes Corel® WordPerfect® 7, Corel® Quattro® Pro 7, Corel® Presentations 7, Corel® FLOW 3, ENVOY™ 7, 150 Typographical Fonts, 10,000 Clipart Images.

warranty information

On-site service may not be available in some remote locations. Call for details of warranty and service agreements. Lease prices are based on a term of 36 months.

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popular upgrades

desktop options

- 3Com Etherlink III PCI Bus Master Combo Network Card \$169
- 3Com Etherlink XL PCI Combo Network Card \$189
- 3Com Fast Etherlink XL PCI 10/100 BTX Network Card \$199
- Upgrade Memory Options
- APC SMART-UPS 1000 \$239
- APC SMART-UPS 1400 \$249
- Epson Stylus Color 400 \$199
- Epson Stylus Color 600 \$249
- Epson Stylus Color 800 \$299

notebook options

- 16MB Memory Card
- 32MB Memory Card
- Lithium Ion Battery
- AC Adapter
- Port Replicator
- Ethernet PC Card
- 33.6Kbps Modem PC Card
- 101-key Keyboard
- VersaPro Carrying Case



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5PCMA



a baker's dozen for the pc junkie

These 13 products prove that the PC is more than just a glorified typewriter.

PYRAMID POWER *The NewsCatcher* (\$100 street) from Global Village grabs news, sports, weather, stock quotes, and even e-mail off the airwaves and feeds them to your PC's serial port. New users get one year of free, limited reception, with 90 days of free premium service. After that, premium service costs \$5.95 per month, or \$9.95 per month, with e-mail support.—JM



STARSHIP ENTERPRISE *The Active Home Automation System* from X-10 Systems (\$100 street) lets your PC control a range of household functions via your home's AC wiring. The kit includes a computer-programmable two-way timer/controller module that connects to your PC's serial port, a universal remote control, a keychain remote control, and a radio-frequency transceiver, plus ActiveHome, X10's easy-to-navigate Windows software to automate desired functions. You can program the system to start your coffee in the morning, crank up the air-conditioning before you get home at night, and turn lights on and off to deter intruders while you're away. Once you've programmed the timer/controller, your PC doesn't have to be on for the controller to execute the activities.—JMB



CAPTURE THAT CONTACT The piles of business cards cluttering our desks attest to how long we've waited for a good card scanner. Finally, the Corex CardScan Plus 300 (\$270 street) makes storing and finding business-contact info less of a hassle. Simply feed a business card into the compact unit and the software automatically builds an electronic address-file card with pertinent information about that person. We found the scanner impressively accurate, and the new version lets you build a contact database on your network for others to share.—JMB



MAKE IT STICK If your laser printer regularly does double duty as a label printer, step up to the CoStar LabelWriter XL Plus (\$250 street). This thermal printing device prints rolls of multi-colored, multisized labels for envelopes, disks, bar codes, and the like. It even lets you add digitized photos to ID badges using a PC-connected video camera (such as the Connectix Quick-Cam).—TK



CAPTURE RAPTURE Capturing both still and moving images is rudimentary with Connectix's QuickCam (\$230 street). Powered by your keyboard port, this racquetball-size camera perches on a rubber stand on your desktop or monitor, making it handy for videoconferencing. It uses QuickPict software to process still images and QuickMovie for motion video. VideoPhone videoconferencing software costs \$60 (street).—CM

TV ON YOUR PC You can watch CNN or Regis and Kathy Lee while you work by connecting a TV tuner box to your PC. One of the easiest solutions we found is AVer-Media's TVGenie (\$150 street). The self-contained external box means you don't





work in comfort

Create a more healthful work environment with these ergonomic essentials.

1 THE COMFY CHAIR Grahl's patented duo-back design may look odd, but the split cushions cradle your back and allow freedom of movement without putting pressure on your spine. It is offered in a range of styles, and prices start at \$700.

2 SQUISHY IS BETTER One feel and you'll know that Fellowes Computerware uses its Memoflex Gel technology to make the Gel Wrist Rest (\$16 street). The result is firm yet squishy support that molds to the shape of your wrists. The slip-proof pad also contours to ergonomic keyboards.

3 EASY ON THE WRISTS An ergonomically designed keyboard, such as Microsoft's Natural Keyboard (\$100 street), can help prevent repetitive-stress disorders.

4 THE RIGHT HEIGHT Keeping your head and neck in proper alignment can help alleviate strain and headaches. An adjustable monitor stand, like Rubbermaid's CRT Valet (\$130 street), is the answer.

5 DON'T LOOK DOWN Looking down at copy and back up to the monitor is bad for your neck and wastes time. Attach an inexpensive copy holder to your monitor, such as the Curtis Clip (\$5 street), so the copy is easily readable when you need it.

6 EASY ON THE EYES Most monitors now have antiglare coatings, but none of them work as effectively as an add-on glare filter to lessen eye strain. OCLI offers a full line of GlareGards starting at \$20 street.

7 SQUISHY, TOO Belkin uses a gel similar to Fellowes' in its ErgoPAD Gel mouse pad (\$20 street). The gel pocket cradles your wrist while allowing comfortable movement.



MOVING COMFORT The Grahl Duo-Back moves with you as you reach, always providing proper support.

9

8

● **THE NIGHT RATE** In case it's your job to make sure a group of people are working comfortably, you may want the Extron SRI 200 Automatic Horizontal and Vertical Scan Rate Indicator (\$180 street). Simply hold the device against a monitor screen: The LCD readout will indicate the monitor's actual refresh rate, so you can be sure folks are working flicker-free.

● **GIVE YOUR SHOULDER A BREAK** There's nothing more uncomfortable than holding a phone to your ear with your shoulder while you're typing. Invest in a comfortable headset such as Plantronics' GAT182 PG Headset (\$89 list). Its teeny earphone/mike combination delivers good sound, and it could save you money on chiropractic bills.

PUT YOUR FEET UP Resting your feet properly while working can take a lot of strain off your legs and lower back. We recommend an ergonomic footrest (not shown), such as Rubbermaid's ComfortTread Footrest (\$30 street).—JMB

have to open up your PC, and the unit features several video input choices, a wake-up timer, and background sound so you can just listen to the audio portion of broadcasts.—CE

SMILE! Play Inc.'s award-winning Snappy Video Snapshot (\$200 street) captures high-quality still images from video. This parallel-port device accepts output from your VCR, camcorder, or cable box; the package includes Snappy Software for fine-tuning your

masterpieces, as well as Kai's Power GOO, Gryphon's Morph, and Adobe Photo-Deluxe.—JM



PHOTO SCANNER FACE-OFF Sleek design, good image quality, and a superior software bundle, including Kai's MetaTools, make Kodak's Digital Science Snapshot Photo Scanner I (\$180 street)

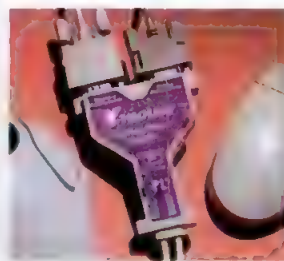
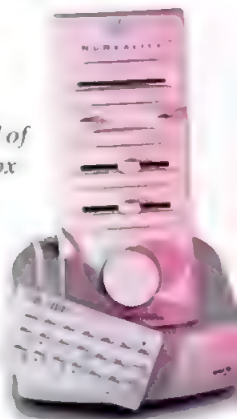
the best photo scanner we tested. From setup to scan took less than 10 minutes, thanks to its clearly detailed documentation and fine Twain driver. Runner-up: Storm Technology's EasyPhoto Reader

(\$200 street) also delivered admirable image quality and a fun design that features a detachable head for scanning bulky images.—TK



BETTER MULTIMEDIA The Vivid 3D Proex sound-enhancement system (\$110 street) from Nu-Reality is all you need to pump your games full of dynamic SRS 3-D sound. The sleek external box sits between your sound card and speakers to add the enhanced-sound effect, and it serves as a handy volume control.

Most CD-ROM drives don't offer the track controls of a CD player, but force you to use the software interface. Labtec solves this problem with its QuickSound LCS-8010 (\$40 street). The small keypad mounts to your monitor or keyboard, giving you swift access to CD functions.—TK



TWO AT A TIME Why choose between a mouse and a trackball (or other input device)? P.I. Engineering's Y-mouse Dual Serial Mouse Adapter (\$50 street) lets you have both connected at the same time. The Y-key-key Dual Keyboard Adapter (\$50 street) connects two keyboards simultaneously.—TK



better mice and keyboards

There's a range of input devices tailored to special needs. One of these should suit you.

READY FOR TAKEOFF

With Gyration's GyroPoint (\$70 street), you don't have to roll your mouse on a flat surface. Miniature gyroscopes inside this oblong pointer let you move it in free space and control the cursor, which can be ideal for kicking back and scrolling around the Web. It can also be used as a traditional desktop mouse.—MJP

SEAMLESS SCANNING Visioneer's PaperPort ix (\$250 street) is a monochrome page-fed scanner elegantly mounted on a Windows 95 keyboard. Just feed paper (news clippings, business cards and so on) into it. The scanner accepts all sizes up to 8.5 inches wide and 30 inches long. It turns itself on,

launches the software, and displays your scan on-screen as a thumbnail image. The management software is intuitive; we needed only a quick flip through the documentation. Setup is more complicated than for a standard keyboard. To avoid system conflicts, make sure you have a free COM port before you begin.—TK

SOUND WITHOUT

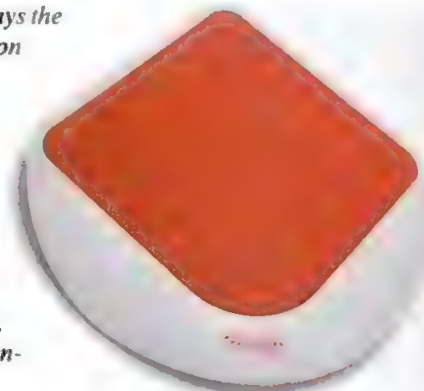
SPEAKERS? NOT EXACTLY. NMB's Concert-Master Multimedia Keyboard (\$100 street) has a stereo speaker system built right into a Windows 95 keyboard. It has a 2-watt amplifier, SRS's three-dimensional surround sound, and a built-in microphone good enough for many users.—TK



KEEP IN TOUCH If a touch pad is your pointer of choice, consider one of the two fine integrated keyboards and pads we tested. Acer America's Future Keyboard (above; \$70 street) features an ultra comfortable palm rest and unique touch pad design. Positioned centrally, the pad features the right and left mouse buttons and large multidirectional arrow keys. The numeric keypad comes detached from the central keyboard but can be attached if needed. We also liked Synaptics' The Wave 109-T Keyboard (not shown; \$80 street). This Windows 95-only device installs easily and includes a unique indicator that displays the amount of stress being put on the pad.—BK

PRACTICAL AND STYLISH

Spark Innovation's Mouse Controller (\$10 street) places the pad in an ergonomically sloped plastic base that's attractive and comfortable to use. Choose red or black pad centers.—JMB



CUT THE CORD Need a wireless keyboard for the corporate boardroom or browsing the Web? Sejin America's compact SPR-8636-WT (below left; \$139 list) is an infrared keyboard with integrated trackball. It works reliably as long as you maintain a clear line of sight between the keyboard and the IR receiver. More robust is the radio frequency-based Wireless SurfBoard (below right; \$400 street) from Wireless Computing. The keyboard and touch pad have a range of 50 feet, and the RF technology means you don't have to be directly in line with the host PC.—BK



"They thought my new multipath Back-UPS® Office™ was just a big surge suppressor – then the lights went out."

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Back-UPS Office's Internet Ready, Fax Modem Protection prevents surges from damaging internal PC external modems, motherboards, peripheral cards and other system components.

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Power problems attack computers relentlessly. Did you know that you have a better chance of winning the lottery than of escaping power problems?

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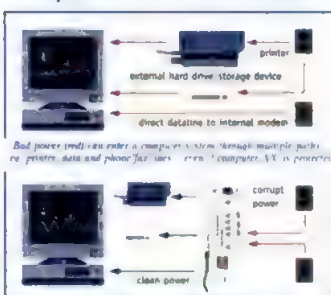
Unique multipath protection keeps your PC and data safe

Plugging phone lines or other peripherals into your computer increases your vulnerability to power

problems. When a surge hits an unprotected peripheral, it can blaze down serial cables and datalines, and toast your expensive PC. Multiple peripherals

and datalines to and from your system are vital, but dangerous. Without them you can't do your job. If a power sag locks your keyboard or reboots your computer before you've saved work, or while you are downloading from the Internet, you can lose data, time and money. Don't spend another late night at the office to meet your deadline. Join over 6,000,000 computer users worldwide who prefer APC to protect hardware and data.

Multipath Means Total Power Protection



The Multipath protection of Back-UPS Office eliminates peripheral and guards your computer from bad power. In other words, providing clean, safe power to everything in your entire system.

Back-UPS Office protects your entire system

Until now, protection for your entire system required several devices. Back-UPS Office means clean, safe power to every peripheral, and instant battery backup to keep your system from crashing. It means protection for less by integrating the security of a surge suppressor with the power of a UPS, guaranteed up to \$25,000.



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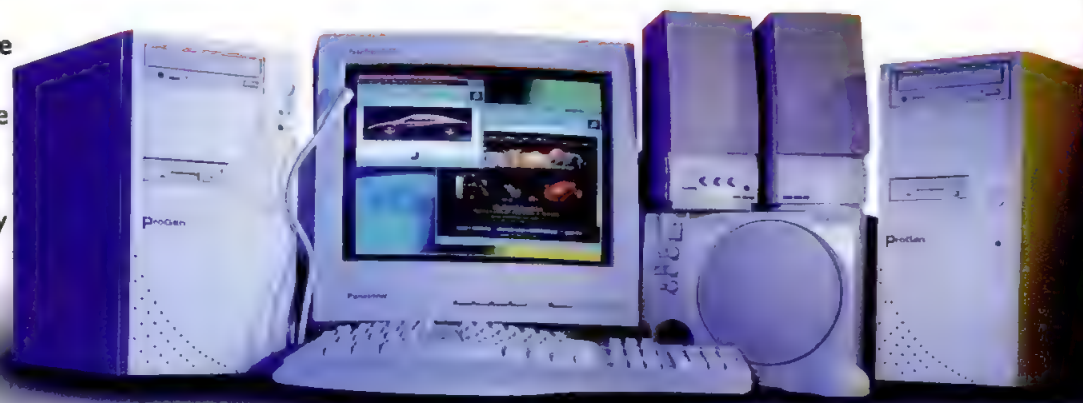
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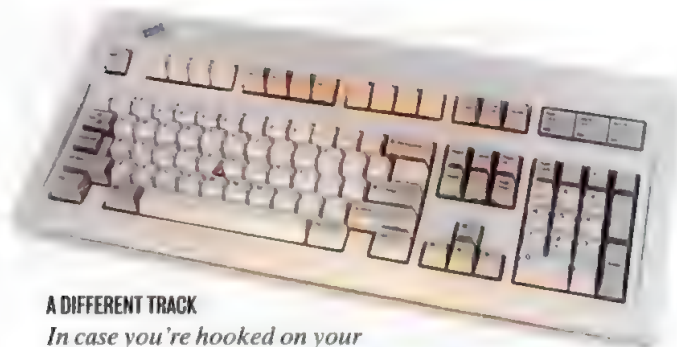
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**A DIFFERENT TRACK**

In case you're hooked on your notebook's tracking stick, IBM brings the configuration to the desktop with the full-size Enhanced Keyboard with TrackPoint II keyboard (\$180 street). It has the familiar "eraser" pointing device in the center of the keys, with mouse buttons positioned below the Spacebar.—BK

GO HERE NOW At first glance, the LaunchBoard (\$60 street) by Darwin Keyboards looks like a standard keyboard, but its software lets you hot link function and DOS



keys to popular Web sites or frequently used applications. If you repeatedly visit the same sites, the LaunchBoard lets you program one-stroke access, increasing productivity. It includes blank keys to customize favorite destinations and a neat key-removal tool. If you'd rather convert your existing keyboard into a launch-board, you can purchase the software only for \$50 (street), which includes everything but the keyboard.—BK

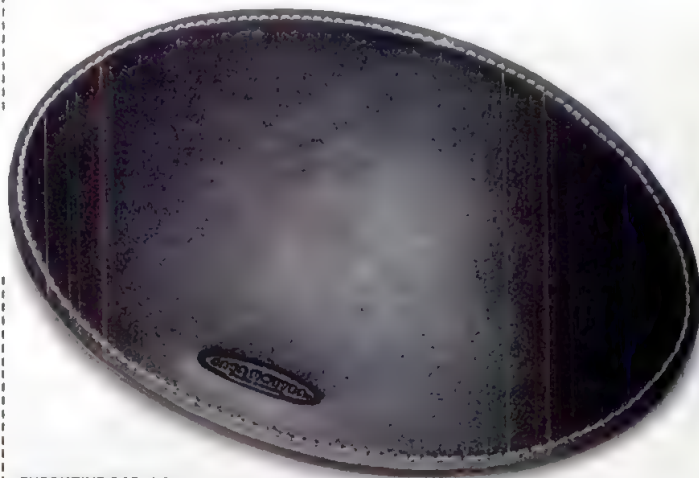
A LITTLE TOUGHY A roomy design and versatile driver make Cirque's GlidePoint Touchpad 2 (\$80 street) the best touch pad we've tested. The driver controls let you customize everything from pointer



size and sensitivity to edge motion, drag lock, and shortcut assignments—even the orientation of the pad. We also liked the convenience of the Synaptics EZ-Point Touchpad (\$50 street). Its four large buttons make for quick and easy clicking.—MJP



GET ON TRACK Logitech's TrackMan Marble (below right, \$100 street) is our favorite trackball. The device fits the adult hand well: Its marble is positioned on the left to roll easily using the thumb. Logitech's mouse software lets you customize its three buttons—assigning a double click to one click of the middle button, for instance. Kensington's Orbit (\$100 street) also deserves a mention. This ambidextrous device positions the translucent blue marble dead center (with a big button to each side) for smooth rolling with thumb or forefinger. At home, it's a good family trackball that suits a variety of hand sizes. Kids especially find controlling the trackball an easy task.—TK



EXECUTIVE PAD If you appreciate fine things, consider ApropaGruppen AB's Orbit mouse pad (\$35 street) from Sweden. Its leather surface comes in shades like cognac and sand. Even the backings come in an indulgent range of nonslip materials, from rubber to suede. Other shapes are available, too, including a square (the Nivorna), a circle (the Ritorno), and a bitten apple (the New York, of course).—MNR

TAKE YOUR DAUGHTER TO WORK Some mouse-pad kits require you to mount photographs permanently beneath the surface, but the Picture Pad (\$8 street) from Silicon Sports caters to your fickle side by letting you slip photos in and out without glue—or commitment.—TK



HIP Put some drama into your desktop life with holographic mouse pads from the Draga Communications division of AmeriConcepts. Great Balls of Fire (\$16 street) puts the flames of hell within reach; Green Ice (\$14 street) dips your hand into a chilling pool; Holographic Spheres (\$14 street) creates a more subdued 3-D effect.—TK

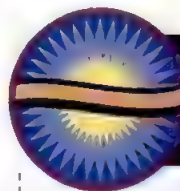


RETRO HIP It's the mood ring, nineties style. The heat-sensitive surface of Kensington's HyperMood Mousepad (\$15 street) makes groovy patterns when you use the mouse. Handprints fade from turquoise to blue to purple, then back to black.—MNR



MIDLIFE CRISIS Classic Car Mousepads (\$10 to 12 street), from Computer

Fun, are Gary O'Mary's original works printed on the everyday mouse pad. Choose from your favorite car classics or from "Star Trek" and baseball motifs, plus 11 animal-shaped pads for the kids.—JMB



power and control

Take care of all your PC connections with these ten products.



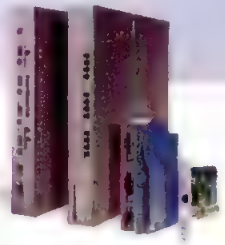
SAFE FROM SPIKES Keep all your equipment protected from power surges and spikes with elegant power centers that slip beneath your monitor. One of our favorites is Kensington's MasterPiece Plus (\$100 street). This slim, lightweight device offers seven surge-protected outlets (two continuously powered) and a protected phone line for modem or fax. Four switches let you turn individual peripherals on and off, and a warning light and alert buzzer indicate low voltage.—TK

OFF THE FLOOR Another smartly designed power center is the MasterPiece Plus Remote (\$110 street) from Kensington. This device has five outlets (one continuously powered) and a phone-line protector, plus a remote switch you can mount next to your PC so you don't have to reach under your desk to turn off the power.—TK



TRANSFORMERS BE DAMNED And if those pesky transformer bricks on your peripherals' power cords block several outlets, you'll want APC's Cable Extender (\$5 street). This set of 12-inch

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extension cords will solve the problem by moving the power brick away from the strips.—JMB

DIRECT CABLE CONNECT

To share drives or transfer files between two Windows 95 systems, connect them via parallel port with Parallel Technologies' Direct-Parallel Universal Cable (\$70 street), the fastest transfer cable we've seen.—TK

SCSI ALL AROUND If you're willing to trade performance for versatility, Shuttle Technology's Shuttle Connection (\$100 street) lets you run any SCSI device on your notebook



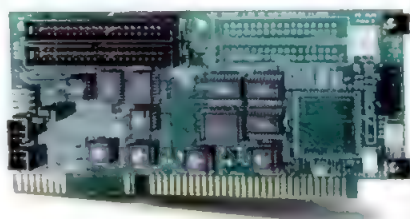
or PC via the parallel port. Its pass-through cable design even lets you keep your printer connection.—TK

COMMAND CENTERS With Command Communication's ComSwitch 5500 Telephone Line Management System (\$129.95 list), your home office won't need a second phone line. The size of a small answering machine, this call router connects up to three devices—such as a phone and fax or a modem and answering machine—and directs each call appropriately. If you already have distinctive-ring service from the phone company, Command's beeper-size RD2 Distinctive Ring Call Manager (\$49.95 list) offers the same. In case you want to switch your modem or fax manually between lines 1 and 2,

Radio Shack and Command also have RJ-11 switchers for \$15 and \$25 (street).—TK

MORE AND BIGGER DRIVES

Power users may be interested in GSI's Model 2C Intelligent EIDE Adapter (\$50 street). The card installs easily into an ISA slot, adding two accelerated EIDE channels so you can connect up to four EIDE drives (or up to eight in a PCI system). In addition, the included Bigabyte BIOS manager lets users with older BIOSes use drives larger than the former 2.1GB limit.—JMB



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ELECTRIC EYE

Any IR-equipped notebook can send print jobs to any parallel-port-connected printer with Extended Systems' JetEye Printer (\$130 street). Its pass-through adapter allows you to print either through IR commands from up to 1 meter away or through a standard parallel



cable. It's ideal for those who shuttle a laptop between home and work and don't want to fuss with a printer cable every time. —MNR

SHARE WITHOUT WIRES The GoPrint/EZ system (\$130 street for the starter kit), from AeroComm, lets small offices and workgroups (up to 32 users) share a printer without a print server, LAN, or other network connection. Hook up the high-frequency radio transmitter to your PC's parallel port and connect the receiver to the printer. You can print from up to 500 feet away—even through walls and floors—at LAN speeds. Configurable channels let you share up to four printers without interference. The system uses error detection for perfect print jobs and handles them simultaneously. GoPrint versions are available for 16 to 128 PCs sharing 8 printers. —JMB



SHARE THAT PRINTER

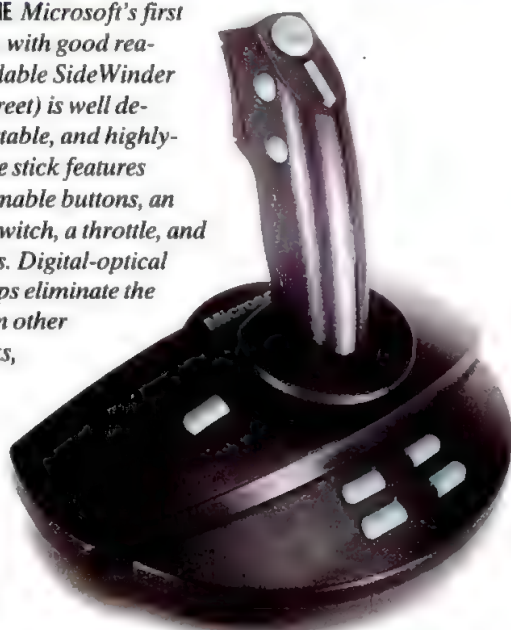
SmartPrint (\$199 list), from Dresselhaus, is a solution for connecting two systems to the same printer. It's an ideal answer for two small-office or home systems when setting up a network would be overkill. The kit includes two computer modules and one printer module, cables, and a power supply, as well as print-utility software. As your office grows, you can add more printer modules, ultimately connecting as many as 32 computers to a printer. You connect the modules by means of ordinary telephone cable, and your PC and printer can be up to 1,000 feet apart. —TK



gamer's heaven

If your keyboard isn't cutting it, consider these game controllers.

GETTING IN THE GAME Microsoft's first joystick is a hit, with good reason. The affordable SideWinder 3D Pro (\$60 street) is well-designed, comfortable, and highly-responsive. The stick features eight programmable buttons, an eight-way hat switch, a throttle, and rudder controls. Digital-optical technology helps eliminate the "drift" found in other analog joysticks, making the SideWinder 3D Pro one of the most accurate game controllers we've tested. —MER



A LIFE OF ITS OWN If gaming is your obsession, consider the higher-end Force FX joystick (\$180 street) from CH Products. The joystick comes to life in your hands, shaking, straining, and jolting to the actions and reactions of specially enhanced games such as Jet-Fighter III and The Need for Speed SE.

—MER

CONTROL CENTER

More than a game pad, the GrIP System (\$90 street), from Advanced Gravis Computer Technology, is a boomerang-shaped device that you plug into a standard PC game port. It supports four digital game pads and two analog game controllers. Though pricier than the competition, it can't be beaten for organizing your gaming controllers. The GrIP Sys-



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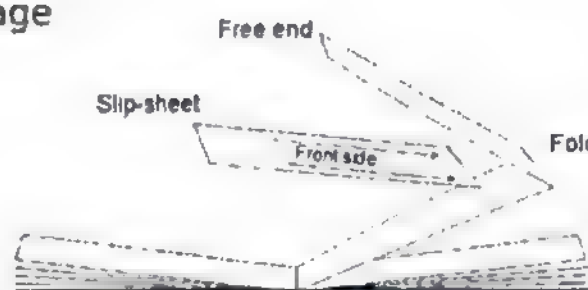
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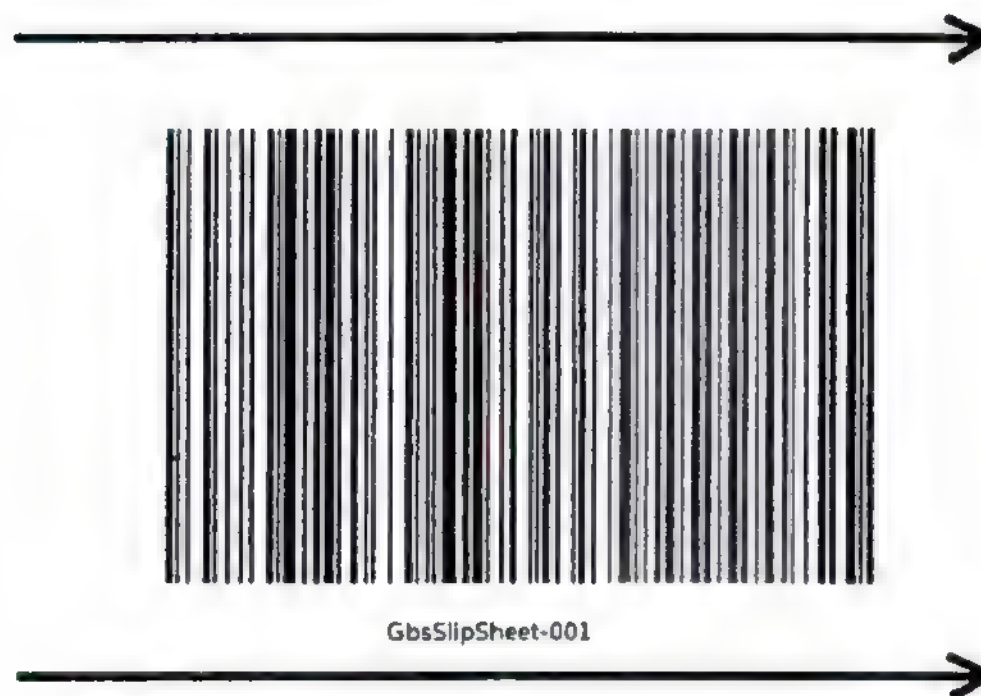
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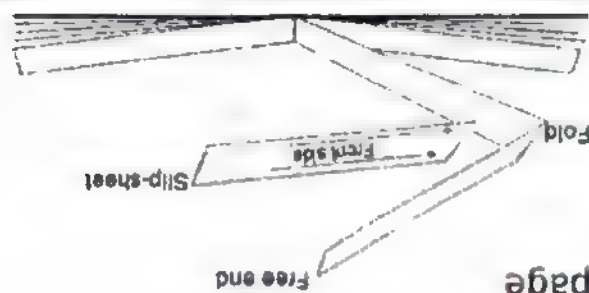


Foldout slip-sheet



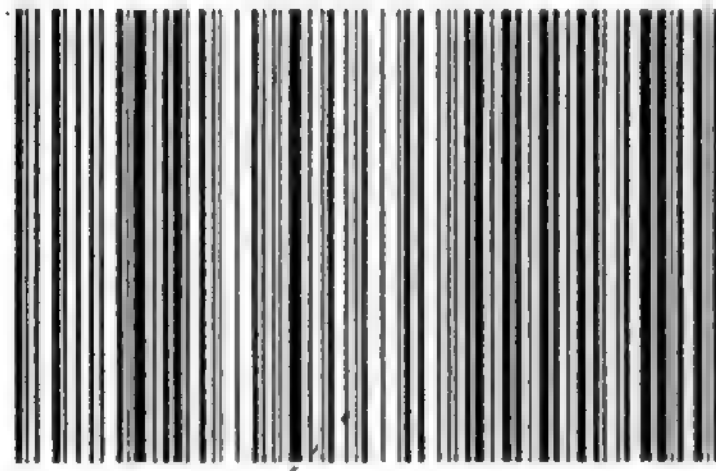
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- 2.5GB 11ms EIDE Hard Drive
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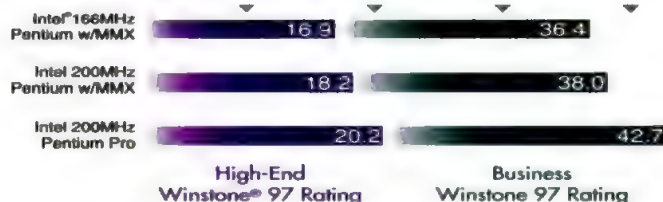
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- Altec ACS-410 & ACS-251 Speakers
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Performance Graph



Ziff-Davis' Winstone 97 Version 1.0 produced scores of 16.9 and 36.4; 18.2 and 38.0; and 20.2 and 42.7 Winstone Version 1.0 units on its High-End Winstone 97 suite and Business Winstone 97 suite on Gateway 2000, Inc. PCs configured with 166MHz Intel Pentium Processor with MMX technology, 200MHz Intel Pentium Processor with MMX technology, and 200MHz Intel Pentium Pro processor, respectively. All Gateway 2000 PCs tested featured 32MB RAM, 256K RAM cache, 3.8GB hard disk, IDE controller, FAT file system, and no hardware disk cache. Systems include S3 ViRGE/VX graphics adapter, with 4MB VRAM with v1.23m3 driver; 1024x768 with 256 colors; and a refresh rate of 75Hz. Test systems used MS DOS 7.1 and MS Windows 95. All products used in the test were shipping versions available to the general public, and the test and its results were not verified by Ziff Davis.

*MS Office 97, Small Business Edition plus Encarta® 97 includes MS Word 97, Excel 97, Publisher 97, Autograph® Streets, Small Business Financial Manager and Outlook™ 97.
**MMX Technology-Enhanced Software Bundle includes Pod™, Eraser™ - Turn About, The Ultimate Human Body Version 2.0, and The Third Dimension™.



Professional Systems

P5-133

- Intel 133MHz Pentium Processor
- 16MB Synchronous DRAM
- 256K Pipelined Burst Cache
- CrystalScan500 .28dp Monitor (13.9" viewable area)
- 2MB 3-D 64-Bit PCI Graphics
- 1.2GB 11ms EIDE Hard Drive
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P5-166

- Intel 166MHz Pentium Processor
- 24MB Synchronous DRAM
- 256K Pipelined Burst Cache
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- 2MB 3-D 64-Bit PCI Graphics
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- 104* Keyboard & MS IntelliMouse
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P5-200

- Intel 200MHz Pentium Processor with MMX Technology
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- 512K Pipelined Burst Cache
- CrystalScan700 .28dp Monitor (15.9" viewable area)
- 2MB 3-D 64-Bit PCI Graphics
- 2.5GB 11ms EIDE Hard Drive
- 12X min/16X max CD-ROM & 3.5" Diskette Drives
- Mini Tower Case
- 104* Keyboard & MS IntelliMouse
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G6-200

- Intel 200MHz Pentium Pro Processor
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- 256K Internal Cache
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- 3.8GB 11ms EIDE Hard Drive
- 12X min/16X max CD-ROM & 3.5" Diskette Drives
- Mini Tower Case
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(upgrade from PCs that include Altec ACS-41 speakers)
- Iomega® Ditto™ 3200 Internal Tape Backup Unit \$199
3200MB with compression, nominal 1600MB
- Iomega Internal Zip™ 100MB Drive \$139
(includes three 100MB cartridges)
- Iomega External Zip 100MB Drive \$159
- Iomega Jaz® 1GB Drive \$429
(includes SCSI controller and 1GB cartridge)
- MS® Windows NT® 4.0 Upgrade \$99
(upgrade from PCs that include MS Windows 95)

Portable PC Upgrades

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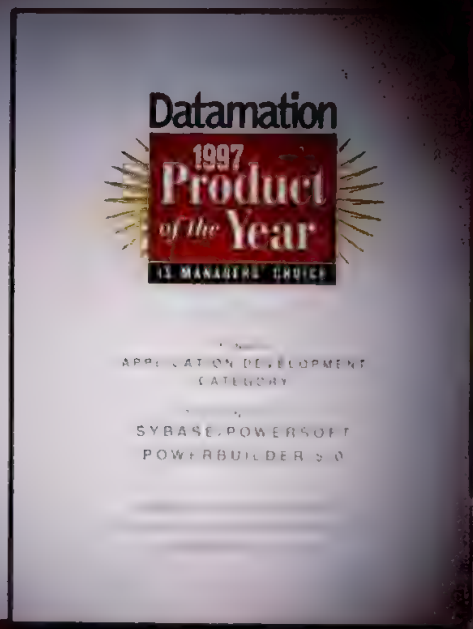
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Hardware Accessories



tem's two game pads are good, but full-time gamers may want to trade up to Advanced Gravis's latest: the GamePad Pro (\$35 street). It's the most responsive game pad we've tested, and it delivers more tactile feedback than others. You can program the Pro's buttons for both

Windows 95 and DOS games.—MER

FOOT TO THE FLOOR When it comes to PC driving games, Thrust-Master's Formula T2 steering wheel (\$100 street) is the ultimate driving machine—featuring both a gear shift and foot pedals for maximum control. The cushion-grip steering wheel (remember the feel of your '78 Trans Am?) has a 260-degree steering



radius, and the control works with the hottest driving games, including Indycar Racing and NASCAR Racing. If you have a not-so-secret passion for the computer road, the T2 is a trustworthy companion.—MER

FLIGHTS OF FANCY You wouldn't fly a real Cessna using a keyboard, so why punch keys to pilot a simulated aircraft? The Virtual Pilot Pro flight yoke (\$80 street), from CH Products, has enough buttons and switches to keep you airborne into the millenium without ever hitting a key. For even more realism, add a set of the company's Pro Pedals (\$90 street), rudder pedals that can be used with either flight simulation or racing games.

—AP



RUMBLE DOWN UNDER You'll get the ultimate simulator experience from Thunderseat Technology's Thunderseat Ace (\$160 street). Mounted in the hollow of this plastic seat is a 100-watt sub-woofer for visceral feedback as you play. Simply run the standard speaker cable from your audio source to the seat and you're ready to rumble. And it's also great for watching action flicks on your home theater system.—AP



kid stuff

Give your kids a head start in the PC arena.

BABY'S FIRST KEYSTROKES Comfy's Activity Center (\$79 list) is a PC-attached keyboard with big buttons, a surprise roller that you can spin for a kaleidoscope of colors, and a red telephone receiver. A series of engaging games and animations will keep any tyke busy for hours. Designed specifically for use with the keyboard, these games aim to teach coordination to your toddlers and strategy to the kindergarten set. Additional titles are available in several languages.—DD



A IS FOR APPLE *kidBoard Inc. provides preschoolers and young grade-schoolers with the kidBoard (\$60 street), a brightly colored keyboard that is as tough as nails. The keys each have both a letter and an icon of a familiar word starting with that letter. So while playing three charming games (included), kids learn the alphabet and master key locations. To en-*



REAR A REMBRANDT *We flipped over the kidDraw (\$120 street) from kidBoard. Its solid, "Jetsons"-like design makes drawing comfortable and fun. The overlay holds paper securely for tracing, and lefties will appreciate being able to switch the pen from their right hand. We also like the kidDraw Paint software. Another drawing tablet,*



Calcomp's Learn 'n' Sketch, (\$90 street) deserves a nod for its software bundle. In Broderbund Software's *Kid Pix Studio*, kids use multimedia effects (including goofy sounds, wacky movies, and digital puppets) to create masterpieces that literally sing and dance. —DD

courage touch typing, the characters are color-coded for the right and left hands. Parents will like the keyboard's full-size standard function and arrow keys and the numeric keypad. Best of all, the kidBoard is a real keyboard, so your kids will never out-grow it.

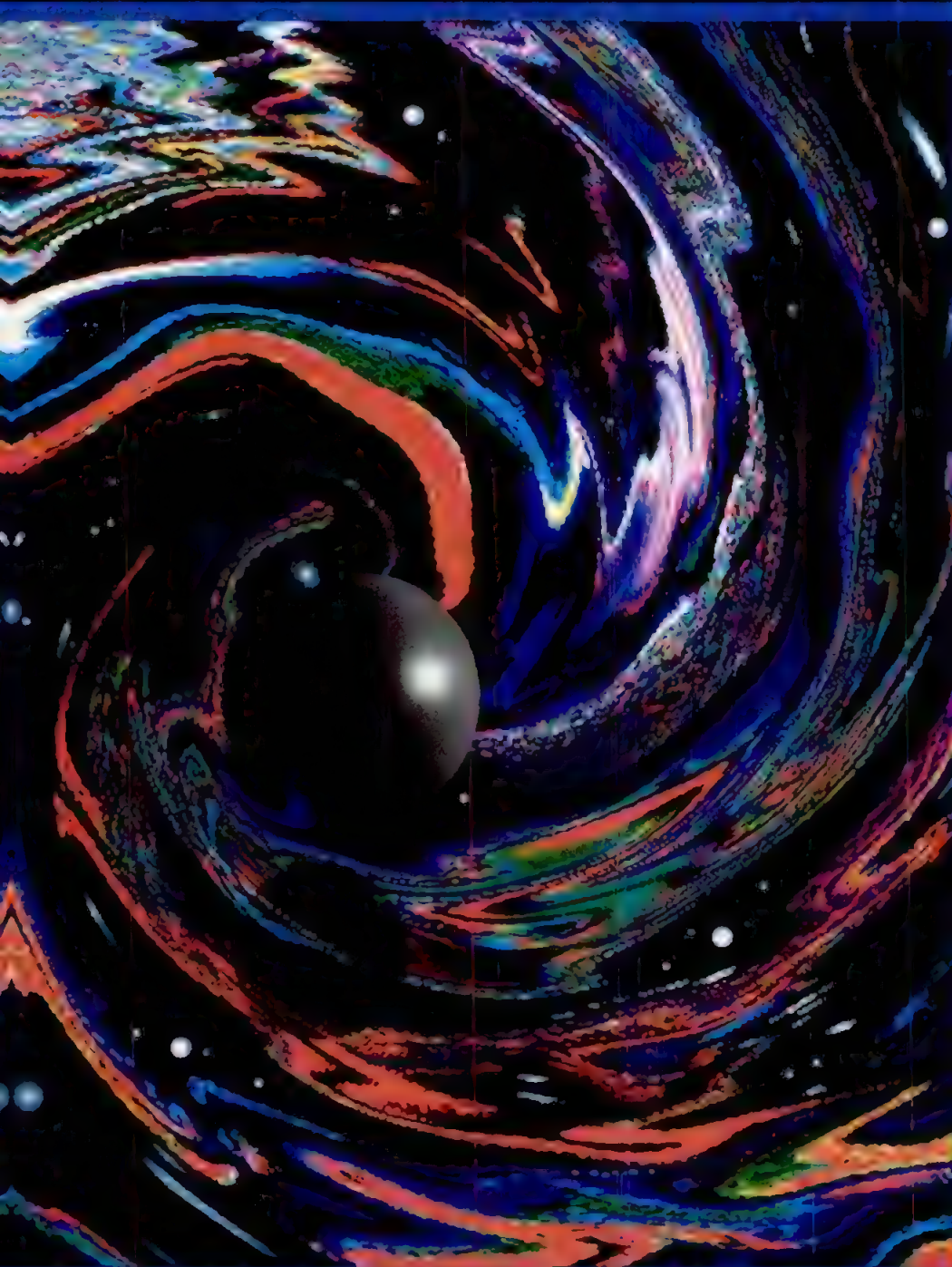
—DD



BIG YELLOW BALL *Microsoft Corp.'s EasyBall (\$55 street) is an oversize trackball for putting computing power into tiny hands. This big yellow ball rolls smoothly, and the single blue button responds well to little fingers. This device does not have a single sharp corner, and it comes apart for cleaning. Its companion software helps kids practice controlling the cursor, which they can change into silly shapes such as an ear of corn. For even more fun, Microsoft now also bundles its popular Freddie Fish software with the EasyBall. —DD*



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Accelerate your world.



keep it neat

These affordable add-ons organize the clutter a PC brings with it.

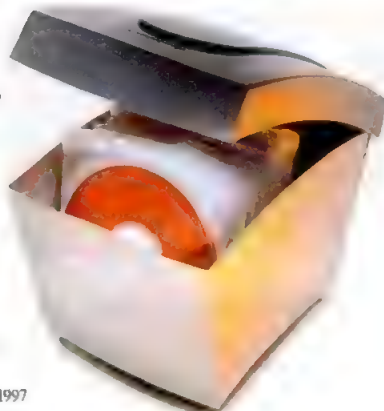
ENDLESS DISK STORAGE Each solidly built Media Storage Drawer (\$70 street), from Kensington, stores up to 200 CD-ROM disks or removable drive cartridges (such as Zip disks). The drawers include plastic file separators for easy flipping; they come in 3.5-inch and 5.25-inch sizes and clip together for infinite expansion.—TK



ALL YOUR DISKS IN A ROW If you prefer to have your CDs more accessible, CD-ROM Flip File Tile, from Allsop, (\$5 for a two-pack), keeps your CD-ROMs neat and ready for finger flipping. Similar to the CD holders used in your neighborhood record store, each modular tile holds ten CD jewel cases; the tiles snap together (both front to back and side to side) so you can add more.—TK



PACK 'EM IN For a more compact desktop solution, there's Case Logic's PDR-50 CD-ROM Storage Case (\$20 street). Each protective sleeve holds a CD and its insert, letting you chuck the jewel case. The case holds 80 CDs in the space normally taken up



by just 20; additional sleeves are available in packs of 50 (\$15 list).—TK



A PLACE FOR EVERY CABLE Set those unruly wires right with assorted Cable Organizers (\$8 street) from Curtis. The pack includes a plastic adhesive-backed ten-slot cord manager, as well as single bundler and runner clips. Simply stick the adhesive-backed holders to the back of your desk and press your cables into place.—TK

DUCK AND COVER If you don't want to see the wires at all, as in a reception area, consider a wiring harness (also called a wiring loom). One of the most attractive we've seen is Rubbermaid's

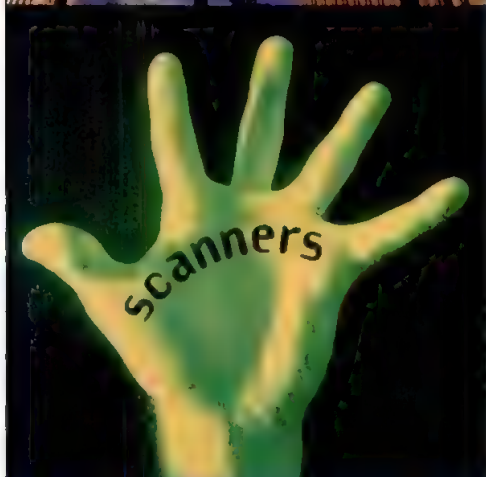


Cable Duck Routing System (\$11 street), which hides the computer cables and wires behind a vertical plastic channel that attaches via adhesive to your desk. Similar products are available from Hold Everything, Radio Shack, and even auto parts stores.—TK

COLOR MY CABLES CaseLogic CT-6 Cable Ties (\$3 street) are nylon strips that wrap around cable and wire bundles to make them less unsightly. Select the multicolor pack for color-coding your cables or all black to blend right in. They're also great for home audio and video cablings.—TK



FIREPORT SCSI ADAPTER KITS. Now Diamond Multimedia gives you three ways to boost the performance of your PC. Our FirePort 20 PCI Ultra-SCSI Host Adapter Kit transfers data at up to 20MB/second, while the FirePort 40 PCI Ultra/Ultra-Wide Host Adapter Kit transfers data at 40MB/second. And our new FirePort 40 PCI Ultra-SCSI Hard Drive Kit adds a fast 2.1GB Ultra-SCSI hard drive. They support all your SCSI peripherals—under Windows 95 and Windows NT 4.0—and include a suite of installation, diagnostic, and CD-R mastering utilities. So visit us at www.diamondmm.com/fireport40 for the facts.



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www.microsoft.com.

MindPath Technologies Inc.,
Dallas; 800-449-1899, 972-233-9296;
www.mindpath.com.

NMB Technologies Inc.,
Chatsworth, CA; 800-682-8321,
818-341-3355;
www.nmbtech.com.

NuReality,
Santa Ana, CA; 800-501-8086,
714-442-1080;
www.nureality.com.

PaperDirect Inc.,
St. Paul, MN; 800-272-7377, 612-490-8710;
www.paperdirect.com.

Parallel Technologies,
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www.lpt.com/lpt.

P.I. Engineering Inc.,
Williamston, MI; 800-628-3185,
517-655-5523;
www.sojourn.com/~whymouse/web.

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www.plantronics.com.

Play Inc.,
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www.play.com.

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www.port.com.

Road Warrior International,
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714-418-1400;
warrior.com.

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423-877-5477;
www.rubbermaid.com.

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www.sejin.com.

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Shuttle Technology Inc.,
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www.shuttletech.com.

SL Waber,
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609-656-8388;
www.waber.com.

Spark Innovations,
King City, Ontario; 905-833-5122.

Statpower Technologies Corp.,
Burnaby, BC; 800-994-7828, 604-420-1585;
www.statpower.com.

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415-691-6800;
www.stormsoft.com/storm.

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www.tenba.com.

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mmm.com.

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www.thrustmaster.com.

Thunderseat Technologies,
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www.thunderseat.net.

Tumi,
Middlesax, NJ; 800-299-8864,
908-271-9500.

Varatouch Technology Inc.,
Sacramento, CA; 800-888-8281,
916-331-6300;
www.varatouch.com.

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ONLINE SERVICES

TIME

IS IT

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*Online service or
Internet service
provider? The
online services'
financial and net-
work woes beg the
question. We help
you answer it.*

By Jim Bartlett

The word "JUMP" is rendered in large, bold, black letters. The letter "J" has a small "MS" logo with a red dot below it. The letter "U" has a small "CSi" logo above it. The letter "M" has a small "America Online" logo above it. The letter "P" has a small "prodigy" logo with a globe icon above it.

With the media frothing at the mouth over Internet mania, it's become hip to write off online services as irrelevant and outmoded, living out their days in quiet desperation. We conveniently forget that 8 million computer users depend on America Online (AOL) for e-mail, file transfers, and Web access, and that almost 3 million more rely on CompuServe's service, now known officially as CSi. Prodigy, meanwhile, still commands 1 million users, while The Microsoft Network serves no fewer than 2 million members. In fact, about half of all those who connect to the Internet do so through an online service and not a standalone Internet service provider (ISP).

Online services sit in the spotlight's glare, and much of the attention lavished upon AOL, CSi, MSN, and Prodigy has been about mounting business woes and



network difficulties. If you're considering going online for the first time, we think you should evaluate the viability of these services and consider an ISP. If you're an experienced online service user, ask yourself, "Is it time to jump to something else—and is that something else going to be better?"

ONLINE SERVICES STILL MATTER

For now, we believe that online services are still worth strong consideration. A year ago, when the Web clearly began to threaten the Big Four, each responded by forming alliances with Microsoft or Netscape (and in some cases both) to give users a browser equivalent to what ISP subscribers had. When AT&T entered the ISP business and made \$19.95 a month the baseline price for unlimited Internet access, online service customers wondered if what they were getting was worth the mounting online bills. Again the online services responded, matching flat-rate pricing and offering special-content-only plans.

With little difference in pricing or basic Internet access, the real distinction between ISPs and online services rests with the convenience factor. The Web is kind of like Manhattan: Everything is there; you just have to find it. An online service is like a mall in Manhattan: It provides one-stop shopping amid the city's expansive retail environment. The comfort and convenience a mall can provide when one is faced with a broad array of choices can be com-

ONLINE SERVICES

America Online 3.0.....	143
CSI 3.0.....	150
The Microsoft Network.....	154
Prodigy Internet 1.1.....	159
Suitability to Task.....	142
Editors' Choice.....	143
The Best of AOL.....	145
Is an ISP Right for You?.....	146
The Best of CSI.....	150
The Best of MSN.....	153
Summary of Features.....	154
The Best of Prodigy Internet.....	159

Join Us Online
Check out our feature "A Day in the Life of Online," which chronicles performance testing of the online services.....

PC MAGAZINE ONLINE

pared to what an online service can deliver in the age of the Web.

Online services aggregate content for you. Some of that content consists of links to Web sites or is available on the Web as well to anyone with Internet access, but we find merit in not having to explore far to find what you want. Online services also work hard to add value in the form of exclusive name-brand content unavailable elsewhere online, original content, and a sense of community built through special-

interest forums and member chat. And you can go on the Web to get whatever you like.

We found three different strategies at work in the online realm for finding success as the ISPs continue to loom large.

THE RICH EXPERIENCE OF TV

AOL and MSN are committed to making a whole new experience out of the online medium. This new experience just happens to cloak itself in the language of the most popular mass medium the world has ever known: television. Both AOL and MSN assault you with metaphors of channels and shows. Each is trying to create content that can draw an audience as effectively as "ER" and "Seinfeld."

MSN features enough splashy logos, animated introductions, and richly orchestrated music to make you wonder if you switched on your TV instead of your computer. MSN has the general idea down pat, but its content advances are not exactly feasible with today's bandwidth limits. We also found many of MSN's content efforts to be banal or downright embarrassing, and we weren't alone. MSN and its users apparently agreed with us; late in our testing cycle, MSN cancelled a number of its shows because of a lack of success with advertisers and members.

AOL hasn't stretched as far as MSN, but it is awash in TV metaphors and shares network TV's obsession with creating "hits." (The service recently even hired for-

ONLINE SERVICES

How to Read the Suitability to Task Boxes

Connecting and navigating We look at software set-up, connection configuration, user configuration, and interface. You should be able to set up multiple profiles with different access restrictions for a single account. Attractive user interfaces that made navigation easy fared better. You should be able to move seamlessly between Web pages and proprietary content.

Community We rate e-mail, group discussion facilities, real-time chat, and 3-D avatar-based chat. The e-mail interface should make it easy to perform standard mail-management tasks, such as creating folders. You should be able to read and answer mail off-line. Having a special facility to contact fellow members is a notable feature. We look for a wide variety of special-interest groups featuring threaded, easy-to-navigate

Product Name	SUITABILITY TO TASK	
	Power	Ease
Connecting and navigating	Good	Excellent
Community	Fair	Poor
Content	Good	Good
Downloading software	Poor	Excellent
Internet access	Good	Fair

discussion. The service should have chat rooms for general, specialized, and private chat.

Content We consider how much total content is available through the service, weighing proprietary content, aggregated Web content, and locally produced content. We evaluate whether the propri-

etary and locally produced content has Web analogs and whether the online service offers value-added features to content that's available elsewhere.

Downloading software The software offerings should be rich and easy to find. The interface needs to be easy to use, and each file should have a clear description of what it is and when it was uploaded. You should be able to resume interrupted downloads.

Internet access We rate the supplied browser software and check whether the service supports third-party browsers and other Winsock tools. Filtering software should be available to limit Web access by user profile. The service should provide space on its server for you to post your own home page.

Editors' Choice

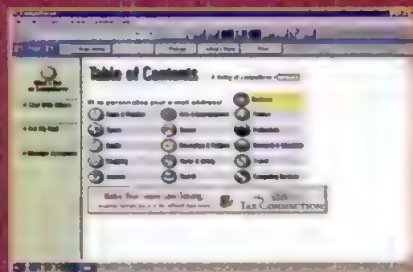
• CSi (CompuServe)



Providing the best of both worlds, CSi, the progeny of venerable CompuServe, delivers what we have come

to expect from an online service while giving us complete and easy access to the Internet and so earns our Editors' Choice award. CSi still offers unparalleled discussion forums, file download libraries, and a flexible and powerful e-mail client. CSi uses a customized but completely functional version of Microsoft Internet Explorer 3.0 as its interface, so you can switch between proprietary content and the Web with a click of the Back button. And even though its content may not always be pretty and heavy users will spend more money than they would with other services or an ISP, CSi brings the kind of valuable information businesspeople need right to the desktop.

Prodigy Internet earns an honorable men-



tion. Bearing little resemblance to the original Prodigy, the new version fills the core functions of an online service—creating a community of users and aggregating content—while operating entirely on the Web within your browser. Prodigy provided a stunningly reliable connection during our testing period, and only its lack of any substantial exclusive content prevented it from garnering better notices. It would be an excellent choice for a new user who wants only the Web.

When it comes to building community, no one works harder than America Online to make you feel special. AOL aggregates a tremendous amount of content and strives to give users a value-added experience over using an ISP. AOL's network problems prevent us from recommending it at this time, but if the service follows through on its promised network upgrades, AOL—by virtue of its friendly interface and special features—will represent the best choice for new users.

The Microsoft Network continues to be the graphically rich but glacially slow service it was in its previous incarnation, despite a major makeover and content push. Waiting for the animated pages to load is hardly a joy, and much of its most interesting content creations, such as CarPoint, are publicly accessible Web sites. If its exclusive sites appeal to you and you have a fast connection, we recommend MSN's content-only plan.

mer NBC Entertainment chief Brandon Tartikoff to develop online programming.) AOL has fostered the development of many popular content areas, some of which now have a life beyond the service, such as The Motley Fool for investment advice.

BACK TO BASICS

CSi, known by all as CompuServe and long revered in the PC community as a provider of great information databases, downloadable files, and serious product forums, once chased content with the same bloodhound intensity as AOL. But CSi has refocused and now gives users the best e-mail, file-download facilities, and forums available online—in other words, much of what people have looked for in online services since their inception. CSi also stands out with its fee-based services, which provide a depth of valuable content not accessible so conveniently anywhere else online. CSi has additionally integrated a modified but fully enabled version of Internet Explorer 3.0.

IF YOU CAN'T BEAT 'EM...

Prodigy has embraced the Internet fervently enough to be subsumed within it—even

renaming itself Prodigy Internet. The service has repositioned itself as an ISP that still performs some of the core functions of an online service. Having shed its interface for a standard browser and a floating toolbar, the new Prodigy aggregates Web content, gives members chat facilities, and produces some original content.

CONNECTION CONJECTURE

AOL has certainly been at the locus of a barrage of negative publicity because of problems experienced connecting to its service. During our two-month testing period, we did have occasional difficulties getting online. But what caused us greater frustration was accessing AOL only to be shut out of core services, such as e-mail, because of too-high server volume.

One problem with the tenor of the press coverage AOL has received is its implication that no other online service or ISP has occasional network problems. While AOL gave us the most connection trouble during testing, we experienced dropped connections, severe slowdowns, and the inability to log on with each online service. These problems generally occurred with no

greater frequency than what we see going online through an ISP. Our 28.8-Kbps connection through Netcom, for instance, was less reliable than our Prodigy connection during the time we prepared this article.

Online services may not be the chichi way for the digerati to get wired these days, but even elite power users might benefit from the aggregated and proprietary content and sense of community. The following reviews and our sidebar on what services ISPs offer will help you make a difficult decision at this critical juncture in the future of online services.

America Online Inc.

America Online

ALL REVIEWS BY JIM BARTIMO

With all the negative publicity surrounding America Online these days, you may think its only use is as a media punching bag. But you'd be wrong. AOL 3.0's easy-to-use interface, easy setup, and clean integration of both proprietary and Web-based content make it a good choice for newcomers to the online world. It features a strong e-mail client and offers some excellent communication tools.

Experienced users may be frustrated by AOL's lack of a browserlike feel. If you've been online for a while and like uncluttered

Our Contributors: JIM BARTIMO is the research editor and EDWARD MENDELSON is a contributing editor of *PC Magazine*. DAVID LIDSKY was the associate editor in charge of this story, and JAY MUNRO was the project leader.

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INTERNET Online Services

Web access, we recommend you choose an ISP, because AOL's strengths clearly lie elsewhere. We had some difficulties getting online and accessing some of AOL's more popular areas during our testing period. Users should take such experiences into account before deciding on AOL.

AOL probably offers more links to con-

SUITABILITY TO TASK

America Online

	Power	Ease
Connecting and navigating	Good	Good
Community	Excellent	Excellent
Content	Excellent	Good
Downloading software	Good	Good
Internet access	Fair	Fair

PRICING OPTIONS
America Online

- \$19.95 a month for unlimited use
- \$4.95 a month for 3 hours, \$2.50 for each additional hour
- \$9.95 a month for unlimited use with your own ISP

tent than any of its competitors, whether that content is original, AOL-exclusive, or Web-based. Though AOL hasn't cut the kind of high-publicity deals that MSN has made, it still stands out in the area of proprietary content, especially for online publications and personal finance.

Its most noteworthy online periodicals include *George*, *Rolling Stone*, and *@Times*, which features sections of *The New York Times* not available on the Web, such as *The New York Times Magazine*. Most of AOL's newsstand sites have their own Web pages, but AOL integrates the content cleanly into its own familiar interface and brings it all together in one location.

By creating original content, AOL goes beyond simple Web aggregation. Early successes *The Motley Fool* and *Parent Soup* thrive on AOL but are now Web staples as well. AOL's regional guide, *Digital City*, and other homegrown successes—such as the *Extreme Fans* sports sites—are expanding onto the Web. Some of these sites offer more compelling versions on AOL, but few of these original productions exist solely on the service.

AOL does add perks not found elsewhere. It consistently, for example, hosts

more online chats with celebrities than any online competitor or Web site. It also distinguishes itself with such exclusives as the forthcoming Barnes & Noble area, which will offer discounts for AOL members.

BROWSER MADNESS

If you have the 32-bit AOL for Windows 95, AOL's strong integration of Web links pays off. When you choose a Web offering from the menu, AOL launches its default browser. This browser is Microsoft Internet Explorer 3.0, even though it looks just like the same browser AOL has had for a while. Veteran AOL users may not realize that they now have full access to the Web's multimedia capabilities, including Java, RealVideo, and Shockwave. You can even configure your own plugins with no more difficulty than if you just had a browser and an ISP.

For 16-bit AOL users, the default browser is a far more rudimentary affair, although AOL says a 16-bit version of IE 3.0 will be available by the time you read this. A crippled version of Netscape Navigator 3.0 is available as an alternative for 16-bit users, but not for AOL for Windows 95. Navigator won't run with AOL's 32-bit Winsock.

E-MAIL AND COMMUNICATIONS

AOL handles e-mail with a built-in program that lets you compose messages

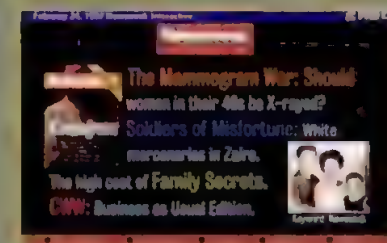
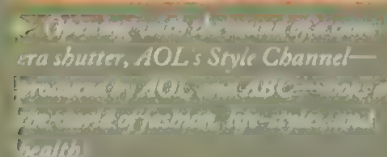
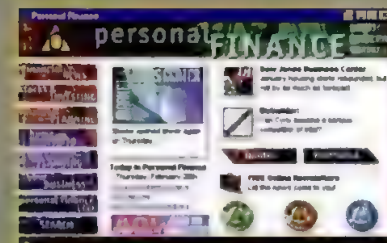


AOL offers solid e-mail, and Instant Messages let users easily contact other members.

off-line and keep a book of commonly used addresses. Notable features available only for communicating with other AOL members include the abilities to check when the mail you've sent was read and to retrieve a message you've sent before it's been read.

The Best of AOL

AOL offers more links to content than any other service and works hardest to bring members something special. A few highlights:



Flash sessions let you quickly upload your completed e-mail and download messages that may be waiting. You can schedule flash sessions to send and receive newsgroup messages and download previously marked files, eliminating the need to wait out downloads during online sessions.

AOL also features Instant Messages (IM), live messages you can send to other AOL members online, and Buddy Lists, which let you track your colleagues' whereabouts within AOL and enable you to join them in chat rooms or send them

IMs. On a few occasions, we could not access our e-mail because of an overload of users simultaneously doing likewise.

Installing AOL is as easy as finding one of the ubiquitous giveaway disks and strolling through a series of menus—unless you have a question. We had to wind our way through AOL's multilevel telephone help system to solve a minor problem preventing us from completing registration.

Downloading software programs, drivers, and files from AOL is a simple process. The Computers & Software channel is well organized, and each file includes

a description, the file size, and the estimated download time. AOL cannot boast as deep a selection of downloadable files as CSi, but its offerings are sufficient for the average user's needs. And unlike FTP transfers over the Internet, AOL (and CSi) file downloads can continue after a system crash from the point at which you left off.

Experienced Web users won't like AOL's screen-handling methods. Rather than sequentially downloading screens that can then be navigated with forward and back buttons, AOL layers downloaded screens one on top of the other

Is an ISP Right for You?

By Edward Mendelson

If you don't want to get on the Internet using an online service, you can use an Internet service provider (ISP). The number of local and national ISPs can be daunting, however. We checked out four major ISPs and one mom-and-pop provider to give you an idea of what to ask before giving any ISP your business.

Go to www.boardwatch.com/isp and thelist.iworld.com for extensive lists of local and national ISPs.

AT&T WorldNet. For \$19.95 per month, AT&T WorldNet offers unlimited service and 24-hour toll-free support. You don't get your own Web page (although AT&T expects to offer space soon for a fee), and you can't upgrade to ISDN. Sign-up includes a branded version of Internet Explorer 3.0; you can get a branded version of Navigator 3.0 from WorldNet's Web site or use any other browser. No other software is provided, but WorldNet's site includes links to shareware and other utilities.

WorldNet is the only ISP here that won't let you read your mail via a different service—while using a friend's computer, for example. But if you can get that friend to download WorldNet's software, you can be online in minutes. (800-967-5363; www.att.com/worldnet.)

MindSpring. With its sense of community, easy-to-use interface, and luxurious set of software and options, MindSpring is the ISP that most resembles an

online service. You pay a one-time, \$25 sign-up fee (it costs \$19.95 per month, unlimited use) and get a detailed printed manual and such software as Eudora Light 2.52, Free Agent, IE, Navigator, WS, FTP, and a dozen shareware and freeware Internet utilities. Other pricing plans offer Web site space of up to

3.0, and other software.

Netcom provides 24-hour support via a toll call and ISDN access in 38 cities. You can also build a 1MB home page. At press time, Netcom was preparing to overhaul its current pricing structure, eliminating flat-rate pricing. (800-638-2661; www.netcom.com.)

Sprynet. Sprynet's \$19.95 unlimited-use plan gives you 5MB of Web page space, weekday phone support from 6:00 A.M. to 6:00 P.M. Pacific time, and online support. Windows 3.1 users can download the installation software through another ISP and sign up online; the Windows 95 software, available only on CD-ROM, is mailed to you. IE 3.0 is the default browser, but Navigator 3.0 is available, and you can use any Internet software you choose.

Sprynet's main distinction is its emphasis on Internet Relay Chat (IRC), with chat rooms that link Sprynet and CompuServe members. (800-777-9638; www.sprynet.com.)

CreativeOnline. This small mom-and-pop provider serves Rockland and Westchester counties in New York and costs less than most national services. \$16.95 gets you unlimited monthly access, Navigator 3.0, 2MB of home page space, and 24-hour support via a local call. CreativeOnline's generic services and attentive tech support are typical of many local ISPs. (888-333-1695; www.creativeonline.com.)

Checklist

- ☒ **Technical Support**
Can you get help at, say, midnight? Is it toll-free? Can you get help online?
- ☒ **Remote E-Mail**
Can you access your mail through another ISP?
- ☒ **Home Page**
Can you post a home page on the ISP's server? Can you upload pages through standard FTP, or are you limited to the templates and tools provided by the ISP?
- ☒ **CGI Scripting**
Can you install CGI scripts for your Web page? (Web page forms are useless without CGI scripting on the server.)
- ☒ **Upgrades**
Can you upgrade to 56-Kbps or ISDN service?
- ☒ **Connecting**
Before signing up with an ISP, dial its local access number from your home phone at various times to see how often you get a busy signal.

10MB and access to other services, such as the Clarinet newsgroups. You can sign up online and connect to MindSpring moments after installation. (800-719-4332; www.mindspring.com.)

Netcom. When you prepay the first month of Netcom's \$19.95-per-month unlimited-use plan, you get disks with Eudora Light 3.0, IE 3.0, Navigator

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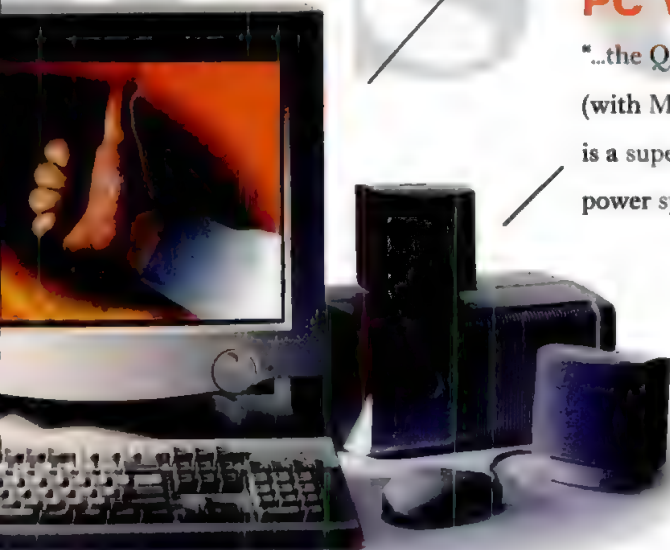
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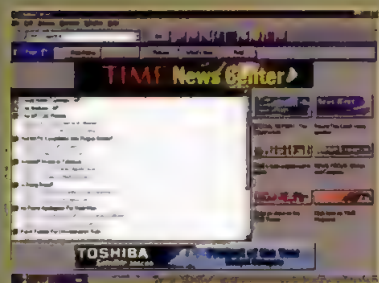
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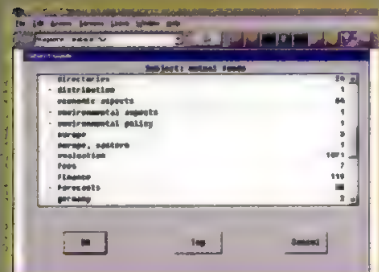
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The Best of CSI

With a solid roster of content and stellar databases of periodicals, CSI offers the greatest depth of content in the online world.



The Time News Center on CSI offers online versions of such staples as Time, along with breaking news from the wire services and other sources.



CSI's database of periodicals such as Magazine Database Plus, gives you access to millions of articles.



If you love movies, you'll love checking out Roger Ebert's opinions online and debating with him.

until your desktop starts to resemble the aftermath of a game of seven-card stud. You can expand the browser window to full-screen, but you can't expand regular AOL screens, even though they often contain scrollable submenus and choices that could use the elbow room.

First-time users who are shy about entering chat rooms will appreciate AOL's smooth welcome into that strange world of anonymous communication. You won't find the anthropomorphic avatars of MSN's Comic Chat area, but AOL provides a wider selection of rooms and makes it easier to identify topics and the number of other participants. AOL also monitors its chat rooms in order to enforce a strict code of conduct. The system is not foolproof, but you generally won't have to worry about the flaming bouts found in the largely unregulated world of Internet chat.

AOL offers first-timers the most complete set of features, but the service's network must improve before we can recommend them.

America Online 3.0. Basic price: \$19.95 per month for unlimited use. America Online Inc., Dulles, VA; 800-827-6364, 703-448-8700; www.aol.com. Circle 465 on reader service card.

CompuServe Inc.

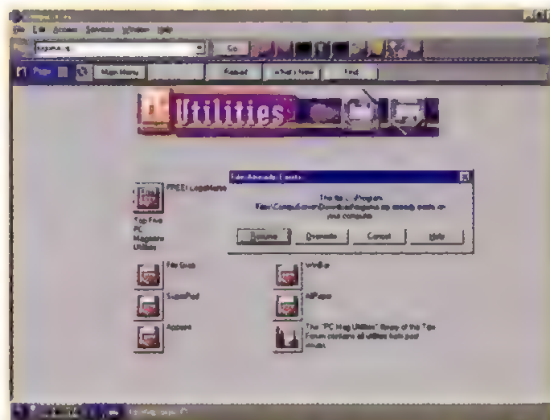
CSI (CompuServe)



While AOL and MSN attempt to fend off the ISP hordes with splashy graphics and television metaphors, CSI 3.0, the online service formerly known as CompuServe, refocuses on the fundamentals of what makes a strong online service. CSI provides dependable connections, e-mail delivery, well-attended hosted forums, Internet access, and an improved user interface. It may not offer the same pop-culture jolt as its competitors, but with its periodicals databases, CSI delivers the valuable information business users need. Without a flat-rate pricing plan, CSI will be more expensive than other online services or an ISP if you're a power user. But we feel the

valuable information available makes it a best-of-both-worlds solution for business-people who'll be using an online service primarily as a reference tool.

We experienced occasional difficulties getting online with CSI, but never for extended periods. We also sometimes lost



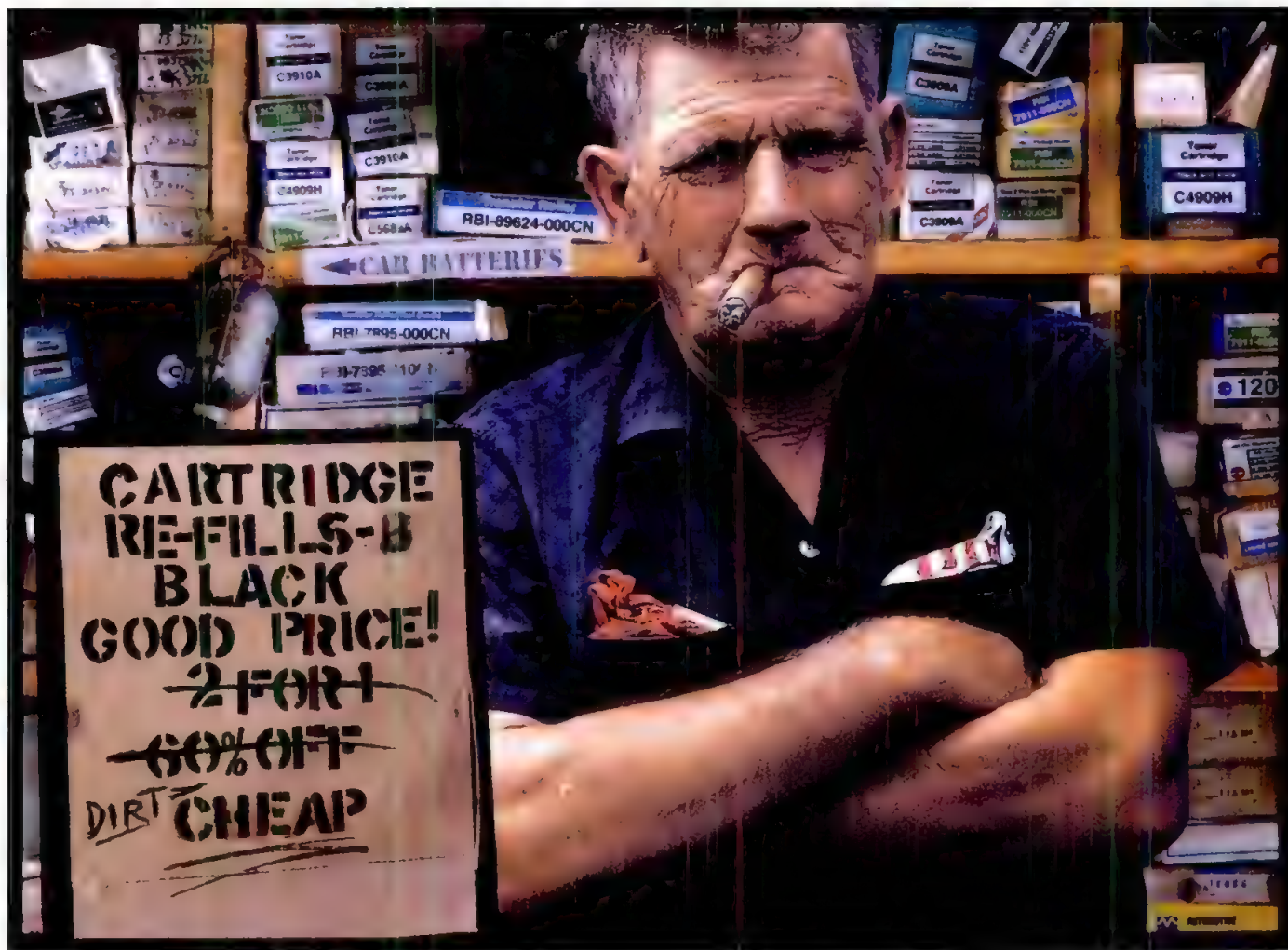
You can resume an interrupted file download from one of CSI's impressive libraries.

our connection when accessing content, but we could always get back on immediately and access what we wanted. We have no qualms recommending CSI as your ISP; experienced users know these problems are endemic to all online networks.

CSI has significantly upgraded its interface, offering a modified version of Internet Explorer for navigating both the service and the Internet. This version of IE is a fully enabled browser from which you can surf the Web and view pages featuring Java, JavaScript, and RealVideo. The additions of forward and back buttons and an address bar have greatly improved navigation over previous versions. You can access e-mail, stock quotes, and forums from either the toolbar or the menu bar. The Favorite Places section can include both CSI content and Web sites for a fairly seamless online experience.

If you really wanted, you could use an external browser to access the Internet, but doing so can cause problems. Many of CSI's menu pages are built in HTML, but the proprietary content behind them is not. If you've selected the external browser option and accessed an HTML-based menu page, CSI will launch the menu page in your external browser. None of the links will work, however, because the content underneath is not HTML-based.

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INTERNET Online Services

While CSI has made great strides with its navigation and Web integration, accessing CSI content is the same experience as it was in the old CompuServe. Text and graphics are not integrated, nor is there much in the way of formatting, so you may prefer to view *Time* or *Money* via the magazine's own Web sites. But CSI's areas usually contain more information and special features not available on the Web, such as the *Money* Personal Finance Center or the full text of each issue of *Sports Illustrated*.

SUITABILITY TO TASK

CSI

	Power	Ease
Connecting and navigating	Good	Excellent
Community	Good	Excellent
Content	Excellent	Good
Downloading software	Excellent	Excellent
Internet access	Excellent	Excellent

PRICING OPTIONS

CSI

- \$9.95 a month for 5 hours, \$2.95 for each additional hour
- \$24.95 a month for 20 hours, \$1.95 for each additional hour

CONTENT WORTH EVERY PENNY

CSI may not be pretty once you dig into the content, but its sheer depth and value are unparalleled by online service competitors or by the Web. Particularly notable are CSI's fee-added services, which offer incredible research value simply not available elsewhere. The volume of content and being able to search easily for what you need make these offerings standout features.

One example is Newspaper Archives, where you can browse full-text archives of 55 daily newspapers—most dating back to the late 1980s but some going back to 1980—for free. And Business Database Plus features more than 2 million articles from more than 1,200 business magazines, trade publications, and industry newsletters. You have to pay \$1.50 to download an article and a 25-cent-per-minute surcharge to use the Business Database, but having ready access to such wonderful resources should more than make up for these minimal costs.

E-MAIL AND FORUMS

CSI's e-mail facility offers some helpful features not available from AOL's pro-

prietary mail client. You can schedule what date messages get sent, receive receipts for CSI mail, and send blind carbon copies. You can search through your mail by subject, recipient, or keyword. Other noteworthy options include the automatic addition of new addresses to your address book and the power to create group mailing lists.

We found it easy to download files within CSI, and we had a multitude of user options. You can use CSI for other tasks while you download a file, or you can mark a file you want and retrieve it later. You can also set up a background connection for such a task. Incomplete transfers can be resumed at any time, something you cannot do with FTP downloads.

CSI's messaging is stronger than that of any other online service or Internet threaded-discussion product. You can read through an entire thread or map a thread to pick where exactly to start, grab an address from a message to add to your address book, and search by author, recipient, message number, posting date, and thread subject. One pesky thing about the forums and the e-mail client is that once you enter, you must explicitly exit before going to another area in CSI.

The forum topics in CSI include nearly every topic imaginable. While MSN or AOL is offering glitzy shows under a menu item like "comedy," CSI is guiding users to the Comedy Central Forum to talk with others about the cable channel's programs. CSI also stays true to its roots with myriad forums for hardcore computer enthusiasts, replete with download libraries that no competitor can match. Even on the Web you won't find such resources assembled in one place.

CSI has retreated from trying to compete with AOL's and MSN's television metaphors, but its business focus is right on the mark. CompuServe's offering is an excellent choice for users who want both Web access and all the benefits of an online service.

CSI 3.0. Basic price: \$9.95 a month for 5 hours, \$2.95 for each additional hour. CompuServe Inc., Columbus, OH; 800-848-8990; fax, 614-457-0348; www.compuserve.com. Circle 466 on reader service card.

The Best of MSN

MSN's originally produced content requires a fast connection to enjoy, but these highlights may be worth the investment.



The ultimate destination for Trekkers of all ages, MSN's Star Trek Continuum offers stunning images, music, and features, such as Shockwave games and video clips.



Entertainment Tonight 811.1, Wednesday, February 19, 1997. Offers MSN users all the important news, music, and information every day, along with such features as video news clips, Frank's Lounge, Mallin.



Offering such features as features, 360-degree Surround Video, walkthroughs of car interiors, 3D Point views, you'll find info you need to buy a car.

SUITABILITY TO TASK

The Microsoft Network

	Power	Ease
Connecting and navigating	Good	Fair
Community	Fair	Fair
Content	Good	Good
Downloading software	Fair	Fair
Internet access	Good	Excellent

PRICING OPTIONS

The Microsoft Network

- \$39.95 a month for unlimited use
- \$9.95 a month for 1 Mbps, \$2.95 for each additional Mbps
- \$9.95 a month for unlimited use with your own ISP

Microsoft Corp.

The Microsoft Network

Trying to take users beyond what's currently available online using impressive animations and a slick interface, The Microsoft Network (MSN) initially wows you with glitz and flash. Dig beneath the surface, however, and you'll find a service not terribly interested in being much more than a challenger to the little-watched, fledgling TV network, the

WB. E-mail and computer reference information—which we believe should form the core of an online service—seem like afterthoughts in MSN. The service, which recommends you use Exchange for e-mail but does not supply it, links into the default MAPI mail client you use with Windows 95, and many of its computer-related forums are still buried in the original MSN Windows-based interface.

MSN is slick, but it may be too slick for its own good. It's painfully slow over a 28.8-Kbps connection and, when it comes to navigating the service, not as user-friendly as you would hope. The most useful content offerings are available on the Web to anyone, and the MSN-exclusive content consists of a small though growing list of "shows" on six different "channels" that are either very good or very bad.

MSN's performance as an ISP is not noteworthy enough to recommend it solely on that basis. Despite an excellent list of POPs, during our testing period we were often unable to log on using our local POP, forcing us to dial long distance for access. We occasionally lost our connec-

tion waiting for a page to load, but no more often than is expected. And at this time, MSN does not provide users space to post their own Web pages—something that the other online services here offer (as well as most ISPs).

MSN'S LOOK AND FEEL

Microsoft has achieved a completely seamless integration of MSN and the Web by building MSN in HTML and Active Server Pages (ASP) and by providing a browser as the primary interface. MSN installs with Program Viewer, a more stylized yet less functional version of Internet Explorer 3.0. Microsoft recommends Program Viewer, but you can still use a standard copy of IE. You can also use Netscape Navigator, but only if you use MSN solely as an ISP. At press time, we could not access any of MSN's proprietary content using Navigator. Microsoft says it is working to remedy this.

Exploring computer-related forums and download libraries, two of the traditionally more popular areas of online services, is a particularly taxing experience. You must navigate a number of screens in the Computing on MSN section before ultimately winding up in the original version of MSN (MSN Classic) or in Microsoft's Internet News client. We discovered that finding a specific file can be especially challenging, with no direct route to the MSN Libraries or Internet FTP sites, nor any discernible differences between the two. If the forum you want to check out has not been turned into a newsgroup, you will have to log on again. When you exit MSN Classic, MSN will prompt you to log off all of MSN and not just MSN Classic.

MSN'S CONTENT LINEUP

Much of the content created by MSN can be found at www.msn.com using any Internet connection. The shows in MSN's On Stage area, which features its most advanced creative efforts, are predominantly available only with a membership. Anyone can access MSN's popular Star Trek Continuum show, for example, but only MSN members will be able to access its 3-D walkthroughs of the starship bridges and such video arcana as commercial previews from the original series.

You'll find MSN's most valuable on-

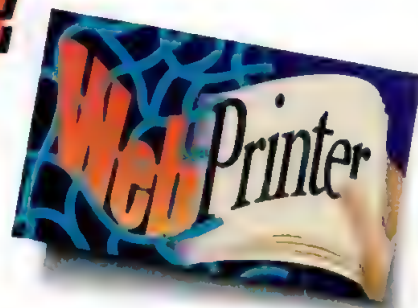
SUMMARY OF FEATURES

Online Services

■ YES ■ NO	America Online 3.0	CSI	The Microsoft Network	Prodigy Internet
Products listed in alphabetical order				
Multiple profiles per account (family accounts)	■	■	■	■
Toll-free telephone access	■	■	■	■
Parental controls provided	■	■	■	■
Space provided for each member home page	2MB	5MB	N/A	2MB
Interface				
Renders progressive graphics	■	■	■	■
User can disable loading graphics	■	■	■	■
E-Mail				
User can organize mail by categories	■	■	■	■
Can display only read/unread messages	■	■	■	■
User can set mail delivery priority	■	■	■	■
Encryption available	■	■	■	■
Transparent MIME/Unicode	■	■	■	■
Downloading				
Background downloading	■	■	■	■
User can restart failed download	■	■	■	■
Online shareware registration	■	■	■	■
Internet Access				
Usenet/IRC access	■	■	■	■
Automatically decodes Usenet binaries	■	■	■	■
Live Chat				
User can hide real name	■	■	■	■
User can lock out undesirable users	■	■	■	■
User can send private messages	■	■	■	■
User can create private chat rooms	■	■	■	■

N/A—Not applicable: The product does not have this feature. *Using MS Exchange. **Using bundled Netscape Navigator 3.0.

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line efforts in the Essentials reference section. This area includes CarPoint for automotive information, Expedia for travel, and Investor for financial material. Almost without exception, any Web surfer with any browser can access these areas. Only Expedia has aspects—such as its Travel Agent utility for finding low airfares—that require an MSN membership or a free, Expedia-only membership for access. It's hard to justify making MSN your online service because of its proprietary content when you can get the best of it with any type of Internet access.

MSN aggregates thousands of Web sites for you to explore in addition to its proprietary content. These links to the Web reveal a useful text description of a site when you place your cursor over its

server. Microsoft says MSN will support POP3/SMTP e-mail by the time this article appears.

MSN's software libraries and forums are buried deep within the service. Once there, you'll find that some forums appear to be all but abandoned while others are quite lively, with healthy discussion and a variety of useful downloads. MSN puts an interesting though not always useful spin on chatting. In addition to a standard text chat interface, you can also use Microsoft Comic Chat, where your text comments become thought and speech balloons attached to avatars. Characters appear in a series of boxes similar to those in the funny papers. Chatters here can choose facial expressions rather than emotions, though the whole experience is more of a novelty than an improvement on text-based chat.

You need about 50MB of free disk space for the installation of MSN, a healthy footprint even for today's large hard disks. Theoretically, MSN installs all these files to provide a rich multimedia experience without the performance loss of delivering all that content over the Internet. But we found the service can still be as painfully slow as the Web is on its busiest day.

If MSN's channels and shows appeal to you, you may

want to try MSN's content-only plan. Unless you have a fast connection, though, we can't recommend the service.

The Microsoft Network. Basic price: \$19.95 a month for unlimited use. Microsoft Corp., Redmond, WA; 800-373-3676, 206-882-8080; www.msn.com. **Circle 467 on reader service card.**

Prodigy Inc.

Prodigy Internet

If you want to get on the Web but are afraid of getting lost out there, you may want to give Prodigy Internet 1.1 a try. The one-time cutting-edge online service Prodigy underwent a makeover around the same time as MSN's metamorphosis late last year, but Prodigy essentially recast itself as an ISP rather than approximate the multimedia assault of an MSN.



A stylized version of IE 3.0, MSN's Program Viewer makes a dramatic impression.

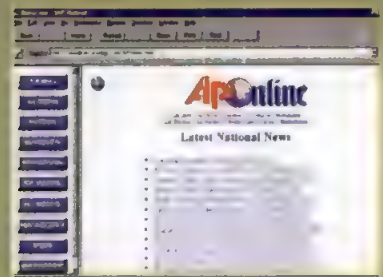
hyperlink. Unfortunately, the sites appear to be in no particular order when you access them from the Find section, and MSN drills down only two topic levels before listing sites. An Internet search directory like Yahoo! will usually include multiple levels of subcategories to further refine your topic search before listing sites—an approach MSN should emulate.

E-MAIL AND COMMUNICATIONS

MSN uses whichever MAPI mail client you have on your system, be it Eudora, Exchange, Outlook, or Windows Messaging. At press time, MSN did not provide POP3/SMTP e-mail. This means you cannot rely on a standard version of IE 3.0 to be your interface to all of MSN, because Internet Mail won't work with MSN unless you have access to a mail

The Best of Prodigy

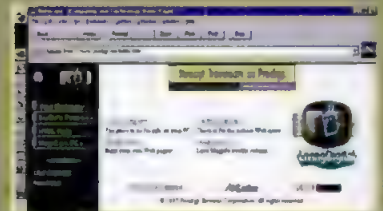
Prodigy's strengths lie in content aggregation rather than exclusive content, but it still has some gems worthy of consideration.



Prodigy's AP Online offers news from the Associated Press, with such categories as national, international, sports, international, and health and medicine.



A homegrown Prodigy site that's a bit like the Internet Soup offers highlights from the Prodigy community online, as well as celebrity gossip and a calendar of upcoming online chats.



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120 MHz³ processor, 8MB memory, 1.08GB⁴ hard disk, 11.3-inch screen, TrackPoint III, 4X CD-ROM, Lotus SmartSuite.⁵ \$1,899.⁶ Available today.



Solutions for a small planet

The newly renamed Prodigy Internet still provides some online service-like functions, such as aggregating Web content and creating a sense of community. It has largely dropped out of the content war, but Prodigy gives new Web users enough guidance to learn their way around quickly.

We found Prodigy reliable as an ISP, consistently delivering us to the Net with no real difficulties. At present, Prodigy installs Navigator 3.0 as your browser (an Internet Explorer 3.0 version should be available by the time you read this). The service, which consists entirely of HTML pages, operates within your browser.

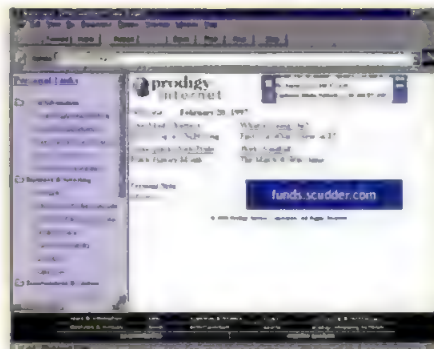
The software you get includes the browser, some plug-ins, the chat client, and the Prodigy Internet toolbar. Some of the icons on the toolbar help build the Prodigy community and differentiate it from a standard ISP. The community-building icons link to the chat interface, newsgroups, and the Web site ratings structure. Prodigy is home to about 175 chat rooms, and while most were sparsely attended if not completely empty, we found a few, including the teen chat area, that seemed popular. You can also set up a Web page using the 2MB of space Prodigy provides each user.

Prodigy's strength is as a Web aggregator. For ten major content areas, including computing and technology, music, and travel, Prodigy has collected Web sites it has prescreened for solid reliability, ease of use, and high quality of content. Prodigy users help by rating Web sites. The input of Prodigy users helps determine which content Prodigy creates links to, developing a sort of Firefly or Yahoo! scenario. Prodigy downloads updates frequently, and it has amassed some fun and otherwise hard-to-find Web sites with this strategy.

In each of Prodigy's ten content pages, a

content-navigation bar sits at the bottom of your browser and contains subcategories of the major topic. Clicking on a subcategory produces a pop-up menu with bookmarks.

Selecting a site from the menu will call it up in the browser while keeping the



Prodigy's personal home page offers a Java news applet and access to its content areas.

navigation bar in place. If you type in a URL or jump to a site from the Go function on the toolbar, you'll lose the bar and, with it, the navigational functionality that is one of Prodigy's strengths.

Prodigy comes up short when you compare its proprietary content with that of AOL, CSi, and MSN, but AP Online, the *Investor's Business Daily* site, and The Study Web score as its strongest entries. Prodigy has some original sites it created, but these tend to be more link aggregators, such as the Real Cities regional guides.

AP newsfeeds are implemented particularly well on Prodigy. Your personal Prodigy home page contains a scrolling Java applet with up-to-the-minute headlines, delayed stock quotes, and local news and weather.

Prodigy may feel like an ISP in the way it relies on the browser for mail and newsgroups, but it does feature its own file libraries. Though not terribly extensive, they are accessible from the toolbar, well organized, and nicely integrated into some of the Prodigy aggregated sites.

All told, Prodigy is best for those who want an ISP but still enjoy the hand-holding and sense of community you get from an online service. □

Prodigy Internet 1.1. Basic price: \$19.95 per month for unlimited use. Prodigy Inc., White Plains, NY; 800-776-3449; fax, 914-684-0278; www.prodigy.com. Circle 468 on reader service card.

SUITABILITY TO TASK

Prodigy Internet

	Power	Ease
Connecting and navigating	Good	Good
Community	Good	Good
Content	Poor	Good
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REMOVABLE STORAGE

Unlimited Options

When it comes to removable storage, there's a drive to suit every need and every user. Here we review 22 leading choices.

More and more of us are becoming good candidates for buying removable storage drives. Removable storage is the only practical way to transfer files with sizes measured in megabytes, create multiple generations of archive files, or shuttle work among home, office, and laptop PCs—capabilities almost everyone needs with today's large data files and hard disk capacities.

Removable storage in this context means any form of read/write storage that you can remove from your computer. Until recently, the only removable storage choices for most computer users were the floppy disk and the tape drive. But floppy disks lacked the capacity users need, and tape drives lacked the flexibility to do more than back up files. Other options such as the Bernoulli Box and the SyQuest cartridge system found only a limited following among project man-

agers who had to lock up files at night, and among graphic artists sending files to service bureaus.

It was Iomega, however, that almost single-handedly moved this category of drive into the mainstream with its affordable, easy-to-use Zip Drive (now \$150 street), introduced in 1995. The cartridges, which are basically floppy disks (that is, flexible magnetic media) in a case, cost about \$14 apiece, or 14 cents per megabyte. Though Zip is one of the two Editors' Choices for floppy disk drive replacements in this roundup (along with SyQuest's EZFlyer 230), that doesn't mean a Zip Drive is necessarily your best choice.

The biggest strength of the removable storage category is also its weakness: There are so many competing, noninterchangeable choices. Capacities range from 100MB to 4.6GB; drive prices range from \$150 to \$3,000, and cartridge

By M. David Stone

prices range from \$10 to \$169 (or from about 1 cent to 19 cents per megabyte).

REVIEW CRITERIA

For inclusion in this roundup, PC Labs sought PC-compatible, removable mass storage drives that currently are available. We tested proprietary drives from market leaders Iomega and SyQuest as well as newcomers Avatar Peripherals and Nomai. We also chose the LS-120 drive as representative of what's available for installation on existing PCs. Developed by Compaq, floppy disk drive giant MKE, and 3M, the LS-120 reads and writes standard 1.44MB floppy disks and also can store 120MB on special 3.5-inch disks. Compaq and MKE are concentrating on PC manufacturers as the primary market for their drives, so we acquired O.R. Technology's a:drive, a bundle aimed at system integrators and end users.

Magneto-optical (MO) drives are available from more than a dozen ven-

dors, so we chose representative 3.5-inch- and 5.25-inch-format models from the seven leading MO vendors: Fujitsu, Hewlett-Packard, Maxoptix, Micro-Design International, Olympus America, Pinnacle Micro, and Sony. These products include two 230MB 3.5-inch portable disk drives, two 640MB 3.5-inch models, four 2.6GB 5.25-inch disk drives, and Pinnacle's Apex—a proprietary 5.25-inch disk drive that offers 4.6GB of capacity. The 5.25-inch cartridges are two-sided; you have to eject and flip over a cartridge to access its other side. MO's claim to fame is reliable long-term storage. Vendors pride themselves on making disk drives that are backward-compatible with previous generations of MO cartridges to preserve users' investments, and the media are rated to last 30 years or more.

We included Panasonic's phase-change dual (PD) drive, which stores 650MB on proprietary cartridges and also

reads (but does not write) standard CD-ROM disks. Several companies sell the PD drive in various configurations, so to complement Panasonic's SCSI version we acquired a parallel-port configuration from Toray. We also tested a representative CD-R drive—Sony's Spresca, which won Editors' Choice in our February 4, 1997, CD-R roundup—since for many users creating their own CD-ROM disks is an attractive alternative to the more proprietary solutions.

Finally, no discussion of removable storage would be complete without tape. Given its sequential nature (rather than the random-access capabilities of disk-based storage media), tape is best suited to backup or archiving where data-retrieval speed is not critical. For testing, we chose a DAT (digital audio tape) drive from Sony. The 4-mm DAT format is popular, and it offers performance and capacity more akin to the disk-based solutions than other types of tape drives do.

Storage Options in This Review

If you need a drive for... look for a... and consider drives in this roundup such as...		
• sharing small to medium-size files with others • making backups of important files • carrying files back and forth between home and work	Floppy disk replacement 100MB to 120MB	Iomega Zip Drive 180 O.R. a:drive 188
• sharing large files with others • sending graphics files to a service bureau • making backups of large files and directories • bringing data and multimedia presentations on the road	Super floppy disk 210MB to 250MB	Avatar Peripherals Shark 250 172 Avatar Systems AR-3210NS 172 Fujitsu DynaMO 230 Portable PC Card Drive 176 Olympus SYS.230 Universal 188 SyQuest EZFlyer 230 195
• distributing large amounts of data • backing up hard disk partitions • storing and running little-used applications • storing multimedia and image files for near-line access • locking up sensitive project files	Hard disk complement 540MB to 650MB	Fujitsu DynaMO 640 176 Nomai 540 187 Panasonic PD Drive 191 Pinnacle Micro Tahoe 640 MB 191 Sony Spresca CSP-9411-S 193 Toray Phasewriter DUAL 196
• creating backups of entire hard disks • using as a second, removable hard disk • maintaining separate operating environments on one PC • storing and running video clips • archiving image files • backing up network drives	Near-hard disk 1GB and up	HP SureStore Optical 2600fx 176 Iomega Jaz Drive 180 Maxoptix T4-2600 184 MDI SCSI Express 2600SL 187 Olympus PowerMO 2600/SCSI 188 Pinnacle Micro Apex 4.6 GB 191 Sony CMO-R540-10 193 Sony SDT-2000E 193 SyQuest SyJet 195

CAPACITY RULES

Tape drives as a group offer a lower cost per megabyte for their cartridges. The tapes for the Sony SDT-2000E drive included here, for example, are less than 1 cent per megabyte—versus 3 cents to 19 cents per megabyte for the other technologies. Tape drives, however, are highly limited for other kinds of applications. Even though some software lets you treat tape drives as if they were disk drives, the time it takes to wind through the tape and find the right file makes them difficult to use for loading a spreadsheet, working on it, and saving it back to tape. For better or worse, end users haven't bonded with tape.

Disk-based drives are by far the more appropriate choice for most purposes, since they will let you read and save files directly from any program and even run programs from the disks. They also make up for their higher cost per megabyte (relative to tape drives) with added convenience. For example, you can back up files by copying them; you don't have to use backup and restore utilities.

Disk-based removable drives are almost all fast enough to serve for *near-line* or *secondary* storage—which lets you keep files handy on multiple disks and pop in the right disk as needed. This is particularly useful if you generate a steady stream of multimedia files with sizes measured in tens of megabytes.

Some choices offer good enough performance that they can serve as primary storage, either instead of or along with a hard disk. For example, you can put all your programs on your hard disk but keep your data on a removable disk that you move between your desktop and notebook or your home and office.

With higher-capacity disks at 1GB or more, you have room to put both your data and programs on the disk, so you don't even have to worry about differences in option settings or program versions between systems. Given performance equal to that of a fixed disk, they can be used as a computer's primary drive. For a system shared by many users, such as a home PC, each individual can have a personal isolated system. This lets you keep your work-at-home environment isolated from the kids' sometimes devastating PC meandering.

Editors' Choice

- Floppy disk drive replacement: Zip Drive, EZFlyer 230
- Hard disk replacement: SyJet



None of the 22 removable drives were disappointing, and half a dozen stand out. Which one is best for you depends on your need for capacity, speed, and data in-

terchange with other users.

If you need a lower-capacity drive for sharing files, making selective backups, or taking data on the road or to and from work, two products win Editors' Choice: Iomega Corp.'s Zip Drive (\$150 street) for its near-universal acceptance and SyQuest Technology's EZFlyer 230 (\$150 street) for superior speed and capacity. The 100MB Zip Drive is affordable, compact, and easy to use. An added strength is its popularity: Many PC users you may need to send files to will have a Zip Drive or have access to one. The drive comes in several configurations—internal SCSI, external SCSI, external parallel—and will soon be offered in an ATAPI version already installed in PCs. The parallel-port version is markedly slower; if you're using a laptop, we recommend the SCSI version instead, combined with a PC Card SCSI adapter.

Our second Editors' Choice, SyQuest's EZFlyer 230, delivers 230MB per cartridge (versus the Zip's 100MB) and much better performance. In fact, it's closer to a hard disk than a floppy disk in performance; you can even play video clips from its disks (we couldn't with the Zip). While the EZFlyer isn't as popular as the Zip with the public, the drive does have support among graphics service bureaus for professionals who send files out for processing. The external

drive is light enough to act as a portable device (1.5 pounds), and there is a parallel-port configuration in case you need to share one drive easily among several PCs.

Another honorable mention is Avatar Peripherals' Shark 250 (\$300 street), a lightweight (just 1½-pound) drive that can store 250MB on its rugged 2.5-inch disks. It connects via the parallel port but still delivered commendable performance, good enough even for video playback. It's a strong bet for road warriors.

At the high end, we award Editors' Choice to SyQuest's SyJet (\$499 list). This drive offers 1.5GB capacity on each \$125 cartridge, and it was the fastest drive overall on our performance test suite. This combination of capacity and performance makes the SyJet suitable as a second hard disk. It can also be set up as a boot device, so you can have an entire operating environment on a single cartridge—for carrying between home and office, for storing securely at night, or for keeping your work separate from your kids' stuff on your home machine. It also makes a speedy backup device. The SyJet's main competitor, Iomega's Jaz Drive (\$500 street), deserves honorable mention. The Jaz, too, offers the capacity and performance to act as a removable hard disk, and it is more widely available from PC vendors as an installed option than the Jet.



Capacity and Performance for Every Need

	Capacity	Speed	Drive/media cost (cost per MB)	Pros	Cons
FLOPPY DISK REPLACEMENTS AND SUPER FLOPPY DISKS					
Iomega Zip Drive* 5.25-inch magnetic cartridge	100MB	☆☆☆	\$150, \$14 (14 cents)	Affordable, easy to use; in widespread use.	Less capacity than other solutions; relatively slow; relatively high cost per megabyte.
LS-120 3.5-inch magnetic cartridge (Compaq, O.R. Technology)	120MB	☆	\$190, \$12 (10 cents)	Reads standard floppy disks; some market acceptance.	Less capacity than other solutions; relatively slow (450 KBps rated average transfer rate).
Mitsumi/Swan UHC** 3.5-inch magnetic cartridge	130MB	☆☆	\$150, \$15 (11.5 cents)	Reads standard floppy disks; good performance (3 MBps rated average transfer rate).	Less capacity than other solutions; market acceptance uncertain; incompatible with the LS-120.
3.5-inch portable MO* 3.5-inch magneto-optical cartridge (Fujitsu, Olympus)	230MB	☆☆☆	\$390, \$10 (4.3 cents)	Speed and capacity let you store and load large files easily (video, digital images); rugged media with long shelf life.	Drives are expensive; not in widespread use.
SyQuest EZ-Flyer Z30* 3.5-inch magnetic cartridge	230MB	☆☆☆☆	\$230, \$30 (13 cents)	Easy to use; good capacity.	Not in widespread use; relatively high cost per megabyte.
Avatar Peripherals Shark 250 2.5-inch magnetic cartridge	250MB	☆☆☆	\$300, \$40 (16 cents)	Small size and good capacity make it a good traveling companion.	Parallel connection hampers speed; proprietary format; market acceptance uncertain; high cost per megabyte.
HARD DISK COMPLEMENTS/NEAR HARD DISKS					
Nomai 540 3.5-inch magnetic cartridge	540MB	☆☆☆	\$300, \$55 (10.1 cents)	Good capacity and speed; backward-compatible with 270MB SyQuest cartridges.	Proprietary format, not in widespread use.
3.5-inch MO 3.5-inch magneto-optical cartridge (Fujitsu, Olympus, Pinnacle)	600MB (300MB per side)	☆☆☆	\$660, \$30 (5 cents)	Good capacity and excellent speed; rugged media with long shelf life.	Expensive; relegated to niche markets.
Compact disk—recordable 5.25-inch optical disk (HP, Sony, Yamaha)	650MB	☆☆	\$800, \$10 (1.5 cents)	Lets you create disks for widespread distribution; low cost per megabyte.	Slow; creating disks can be difficult to master.
PD drive* 5.25-inch optical cartridge	650MB	☆☆	\$600, \$30 (4.6 cents)	Good capacity and excellent speed; drives read standard CD-ROM disks; media with long shelf life.	Market acceptance never materialized.
Iomega Jaz Drive* 5.25-inch magnetic cartridge	1GB	☆☆☆☆	\$500, \$125 (12.2 cents)	Excellent capacity.	Reliability problems reported early in the product's life.
SyQuest SyJet* 3.5-inch magnetic cartridge	1.5GB	☆☆☆☆	\$500, \$125 (8.1 cents)	Excellent capacity.	Market acceptance uncertain.
5.25-inch MO 5.25-inch magneto-optical cartridge (HP, Maxoptix, Sony)	2.6GB (1.3GB per side)	☆☆☆	\$1,800, \$90 (4.2 cents)	Good capacity and excellent speed; rugged media with long shelf life.	Expensive; relegated to niche markets.
Pinnacle Micro Apex 3.5-inch magnetic cartridge	4.6GB (2.3GB per side)	☆☆	\$2,000, \$170 (3.6 cents)	Excellent capacity and speed make it good for network environments; rugged media with long shelf life.	Delayed introduction raised concerns about product viability; not compatible with legacy MO formats.
OTHER OPTIONS					
PC Card hard disk 1.5-inch magnetic hard disk (Integral Peripherals)	340MB	☆☆☆☆	\$450 (\$1.32)	Excellent speed; compact for easy portability.	Expensive.
DAT 3.5-inch magnetic tape (Sony)	2GB	☆☆	\$1,060, \$15 (0.7 cents)	Good capacity; low cost per megabyte.	Relatively slow; sequential nature of tape limits its usefulness.
DVD-RAM** 5.25-inch optical disk (Panasonic, Toshiba)	2.6GB (1.3GB per side)	☆☆	Info not available	Excellent capacity.	Creating disks can be difficult to master; not available until the end of 1997 or later.
Iomega Ditto* 3.5-inch magnetic tape	3.2GB	☆	\$250, \$30 (0.9 cents)	Easy to use; affordable.	Slow; not compatible with other tape formats; sequential nature of tape limits its usefulness.
Travan 3 3.5-inch magnetic tape (HP, Seagate)	3.2GB	☆	\$250, \$35 (1 cent)	Good capacity; low cost per megabyte.	Slow; sequential nature of tape limits its usefulness.
Travan 4 3.5-inch magnetic tape (HP, Sony)	8GB	☆☆	\$480, \$40 (0.5 cents)	Excellent capacity; low cost per megabyte.	Relatively slow; sequential nature of tape limits its usefulness.

☆ The more stars, the faster the drive.

* A parallel-port version offers easier connectivity at the expense of speed.

** Data based on vendors' claims for projected performance.

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Sources: PC World best overall PC company for reliability and service, December 1996.



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REMOVABLE STORAGE

How to Read the Suitability to Task Boxes

There are a wide variety of removable drives to choose from. Some are meant as mass-market backup and data-transport devices, while others appeal to niche segments with particular needs or existing commitment to a certain technology.

To be well suited for **archiving and backup**, a drive should include backup software in the bundle that lets you back up your system and hidden files. A favorable rating indicates that the drive has adequate capacity for full (or at least substantial) hard disk backups, and good performance for such large reads and writes.

To rate well in **data sharing and transport**, a drive should be popular with PC users and service bureaus, so you can send someone a disk with reasonable confidence that the recipient will be able to read it. Portability is a plus, and a drive should be

easy to connect and disconnect. In addition, the drive and media should be fairly rugged to withstand life on the road.

To be a good **hard disk complement**, a removable drive has to have the capacity to store large applications and their associated data files. It must have the performance to let you run applications and play video clips smoothly. The best drives for this task are bootable devices that let you keep an entire operating environment on a single cartridge.

A good rating in **compatibility** indicates that a drive can read (or better yet, read and write) other types of media formats besides its own cartridges. A good score here also may indicate that a drive is backward-compatible with previous generations of the technology.

100MB TO 150MB: FLOPPY REPLACEMENTS

With today's hard disks measured in gigabytes, and with multimedia and graphics file sizes often measured in tens of megabytes, a capacity of 100MB to 150MB is just right for taking over the traditional functions of a floppy disk—moving a few files between systems, archiving or backing up individual files or directories, and sending files by mail. It's not surprising, then, that drives in this range are bidding to be the next-generation replacement for floppy disk drives.

We placed two disk drives in this category: Iomega's Zip Drive and the LS-120 drive from O.R. Technology. There is also a third announced contender—the 130MB UHC-130, with versions promised from Mitsumi and from Swan, but neither was ready in time for this roundup. With a claimed transfer rate of 3,000 KBps (kilobytes per second), the UHC-130 drives should prove faster than the LS-120 (450 KBps) and still be able to read 3.5-inch disks. The street price for this group is under \$200, which is about right for a floppy disk drive replacement.

These drives had the slowest performance on our tests—even with a SCSI connection on the Zip Drive and an IDE

connection on the LS-120. The parallel-port version of the Zip Drive was even slower, though it has the advantage of being able to connect to virtually any computer. When you look at performance figures, keep in mind the role of these drives as floppy disk drive replacements. Don't expect to run video clips from them.

We were most impressed with the Zip Drive. It outperformed the LS-120 and was a snap to install. The 1-pound external model travels well, and the large installed base makes it easy to share files, although we recommend that you go with the faster internal version unless you know you'll need to share the device.

200MB TO 250MB: SUPER FLOPPIES

The 200MB to 250MB range is best understood as super-floppy territory. This is about double the capacity of the floppy disk drive wanna-bes, with performance more akin to a hard disk than a floppy disk drive. We found five drives in this group. Two are 230MB MO drives: the DynaMO 230 Portable PC Card Drive, from Fujitsu, and the Olympus SYS.230 Universal, from Olympus America. The other three—the EZFlyer 230 (an Editors' Choice), from SyQuest Technology,

and the Shark 250 and Avatar AR-3210NS, from Avatar—use magnetic hard disk media.

Drives in this category not only offer more capacity than you need for a next-generation floppy disk drive replacement, they cost more than you'd probably be willing to pay for one, with street prices of about \$250 to \$500.

You may find this capacity just right for backing up your data directories or for holding all your current data files so you can move them easily from one system to another. In that context, note that many of these drives are also at home on a notebook, with internal notebook versions (from Avatar and Fujitsu), external parallel-port versions (Avatar, Olympus, SyQuest), and even a PC-Card, battery-powered version (Fujitsu). This is also a convenient capacity for archiving and for near-line storage for multimedia files.

The magnetic-media drives in this group offer better performance than the MO drives. But even the MO drive performance is good enough to let you play video clips directly from the drives, at least for the SCSI versions.

All five drives in this category are solid choices. Our favorite is the EZFlyer 230 (\$230 street), which offers the right mix of capacity and performance at a reasonable price. Just don't try sticking an EZFlyer cartridge in your shirt pocket; it measures about 5 inches across. Laptop users will want to take a close look, too, at Avatar's Shark 250. The drive's half-pound weight and the tiny (2.5-inch), rugged cartridges appeal to the road warrior.

540MB TO 850MB: HARD DISK COMPLEMENT

The next step up in capacity—540MB to 650MB—is enough to back up a reasonably large hard disk partition. Most such drives also offer good enough performance to function as secondary if slow hard disks.

We found six drives in this range. The Nomai 540 uses magnetic hard disk media. The Panasonic PD Drive and Toray's Phasewriter DUAL are both PD drives, which means they read and write phase-change disks and read CD-ROMs. Fujitsu's DynaMO 640 and Pinnacle Micro's Tahoe 640 MB are both MO drives, with formatted capacities of about 600MB on their 3.5-inch cartridges. Also included in this group is Sony's Spressa

Our Contributors: M. DAVID STONE, BRUCE BROWN, and ALFRED POOR are contributing editors of *PC Magazine*. JAMES KARNEY is a frequent contributor to the magazine, and MICHAEL SCHNEIDER is a freelance writer. JAMIE M. BSALES was the associate editor in charge of this story, and DENIS TOM, a technical analyst at PC Magazine Labs, was the project leader.

Removable Storage

CSP-9411-S, a CD-R drive.

Street prices for this category range from a surprisingly low \$300 for the Nomai 540 to \$660 for Fujitsu's DynaMO 640. The MO drives claim to offer 640MB, but that works out to about 600MB after formatting. The PD and CD-R drives offer 650MB after formatting, and the Nomai delivers 540MB.

From this midrange group we preferred the Nomai (\$300 street after rebate). It's relatively speedy and backward-compatible with SyQuest's 270MB cartridges. Here again, though, the other options are compelling. The MO drives are a good choice for those who have a commitment to MO, or who need bulletproof long-term storage. The Panasonic and Toray PD drives (\$450 to \$600) offer a good mix of capacity, performance, and low cost per megabyte for near-line applications, with the bonus of being CD-ROM drives. The Spessa CD-R (\$800 list) is suitable for permanent backups, archiving, in-house CD publishing, and—thanks to the ubiquitousness of CD-ROM drives—distributing data to almost any PC user.

1GB AND UP: NEAR HARD DISKS

Like near beer, near hard disks don't offer the same punch as the real thing. But with capacities of 1GB and up, and performance that is well into hard disk territory, they are close enough to hard disks to serve as additional primary storage or even your only primary storage if necessary.

We found eight drives in this category. Iomega's 1GB Jaz Drive and SyQuest's 1.5GB SyJet both use magnetic hard disk media. The rest are MO drives. Hewlett-Packard's HP SureStore Optical 2600fx Multifunction Disk Drive, the Maxoptix T4-2600, MicroDesign International's MDI SCSI Express 2600SL, Olympus America's Olympus PowerMO 2600/SCSI, and the Sony CMO-R540-10 all follow 2.6GB standards. Pinnacle Micro's Apex uses a proprietary 4.6GB scheme.

Street prices are \$400 for the Jaz and the SyJet and \$1,800 to \$3,000 for the MO drives. MO disks are two-sided; that means you have only half the capacity available online at any given time. After formatting, an MO cartridge leaves you with 1.06GB

per side. The Apex 4.6 GB cartridge offers 2.12GB per side.

In this class, the SyJet (\$400 list) stands out as the value leader. It is faster than the Jaz and offers 50 percent greater capacity for the same price, although the Jaz has more market presence. With its huge capacity, the Apex 4.6 GB (\$1,900 list) is in a class by itself, and it's worth a look for those whose capacity needs climb that high.

INTERFACE OPTIONS

It should be no surprise that SCSI drives are faster than equivalent drives that connect through a parallel port or PC Card port. But our results show that an inherently slow drive, such as the Zip Drive, connected through a SCSI port, offers dramatically better performance for many purposes than a faster drive, such as Iomega's Jaz Drive, connected through a parallel port.

As a group, SCSI drives are easier to install in Windows 95 than other drives. If you already have a SCSI card installed, you often can simply plug in the drive, and Windows 95 will recognize it on boot-up. At most, you'll have to set the drive's SCSI ID so it won't conflict with other SCSI devices on the card, and make sure the SCSI chain is properly terminated—with termination on both ends of the chain and nowhere in between.

Be aware, too, that only a few of the SCSI drives we saw include bundled SCSI cards. This is a new trend. Manufacturers point out that if they included a card, it would have to be an ISA-bus card to ensure it would plug into any system. If you wanted a higher-performance PCI card, you would still have to pay for the ISA card you'd never use. If you need a card, you can get it from the same source as the drive in most cases. You'll find that installing it

in Windows 95 is usually simple. Plug in a SCSI card and Windows will generally recognize it on boot-up, then stop to let you choose whether it should install the appropriate drive from the Windows 95 disk or from a disk that came with the card.

THE FINAL CUT

Once you've decided on the right capacity for your needs, you can consider other issues. The reviews that follow will tell you what you need to know about each drive's performance, connection options, portability, price, type of media, and media price per megabyte, and whether you can use the drive or media with your notebook as well as with your desktop system. —Michael Schneider contributed to this report.

Avatar Peripherals Inc.

Shark 250

Avatar Systems Corp.

Avatar AR-3210NS

Some people enjoy swimming with sharks. The rest of us will find a more comfortable companion in the Shark 250 (\$300 street) from Avatar Peripherals. This external portable drive connects by parallel port so it can attach to any computer, and its hard disk cartridges are rugged enough to send by mail or toss in a laptop bag. Even better, the 250MB capacity is enough to let you transfer large files or entire directories between systems easily. If you'd prefer an internal version, you can find that too: The Avatar AR-3210NS (also \$300 street), from sister company Avatar Systems Corp., is available through Texas Instruments as an IDE drive for selected models of notebooks.

Installing the Shark 250 in Windows 95 the first time is unusual, since the drive



SUITABILITY TO TASK

	Shark 250	Avatar AR-3210NS
Archiving and backup	Good	Good
Data sharing and transport	Good	Good
Hard disk complement	Good	Good
Compatibility	Fair	Fair

AT A GLANCE

Unformatted capacity	250MB	210MB
Cartridge cost/cost per MB	\$40.16 cents	\$40.19 cents
Sustained write	1,250 KBps	2,100 KBps
Sustained read	1,250 KBps	2,100 KBps

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CREATIVE
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1. Maestro Tapping Baton.
2. Piano Keys Dancing.
3. Entrance Of An Oboe.
4. Crashing Cymbals.
5. Violin Vibrato.
6. "Bravo, Bravo!"
7. Deep, Rhythmic Grooves of a Cello.
8. Clarinet Scaling Octaves.
9. Audience Shuffling In.
10. Appreciative Applause.
11. Chord Progressions On Grand Piano.
12. Soft Strokes Of Harp Strings.
13. Chiming Triangle.
14. "Shhhhhhhhh..."
15. A Cymbal Brushing Lightly.
16. Cascading Clarinet.
17. Flute Solo.
18. Crescendo.
19. Playful Flirtation Of A Piccolo.
20. Boom Of A Tuba.
21. Pager Beeping.
22. Loud Clapping.
23. Low Tones Of A Stand-Up Bass.
24. Violin And Viola En Duet.
25. Piano Sonata.
26. Wailing Saxophone.
27. Smooth Slide Of A Trombone.
28. Exclamation Of A Trumpet.
29. Rolling Thunder Of A Timpani.
30. Arpeggio On The Violin.
31. The Reed Section.
32. Pages Of Sheet Music Turning.
33. Piano Playing Minuet In G.
34. Drum Keeping Tempo.
35. Violin Staccato.
36. Tambourine Jingle.
37. Clicking Castanets.
38. Relentless Beating of Drums.
39. Regal Sound Of A French Horn.
40. Snare Drum Rattling.
41. Xylophone Resonating.
42. The Low Pitch Of A Bassoon.
43. Cello Staccato.
44. Pulsating Viola.
45. Viol D'Orchestre.
46. Flute Ensemble.
47. Fluttering Of A Flute.
48. Regimental Sound Of A Bugle.
49. Plucking Of A Violin.
50. "Encore! Encore!"
51. Orchestra Tuning Up.
52. Silence Between Passages.
53. Harmonic Wind From A Flute.
54. Oboe Solo.
55. Soft Snoring.
56. Decrescendo.
57. Beethoven's 5th.
58. Throats Clearing.
59. Chopsticks.
60. Sounds Of Intermission.
61. Brass Solo.
62. Rattling Of Maracas.
63. "Wake Up, Honey, It's Over."
64. The Final Movement.

gets power from the keyboard or mouse port via a cable (AT-style and PS/2) to which you connect the drive and your keyboard or mouse. You connect the parallel cable, reboot, and install the parallel-port drivers. The cable includes a pass-through port for plugging in a printer. Avatar is working on a version to draw power from the PC Card slot.

Performance from the Shark was excellent among the parallel-port drives we tested, and better than some like the Jaz that are inherently faster but apparently don't handle the parallel port as well. The

Shark didn't drop frames on the video test, making it an appropriate choice for playing video files on the road.

The disks themselves, which go by the name HARDiskette, are rugged enough to survive rough handling even without putting them in their rubberized case. You should have no hesitation about tossing one in an overnight letter pack for express delivery.

The Shark comes with an assortment of software, including NovaStor's Nova-Disk Lite, a capable backup package. All told, the Shark 250 delivers on its promis-

es. If you need a portable drive in the 200MB to 250MB range and you want to connect through the parallel port, the Shark 250 not only belongs on your short list but should be a prime candidate among the few contenders there.

THE INTERNAL SOLUTION

We also took a look at the Avatar AR-3210NS, the 210MB internal SCSI version of this drive, which will be replaced by a 250MB version in the near future. If you have a SCSI card, installing the drive in Windows 95 involves nothing more

Swap the Drive, Not Just the Data

By James Karney

Can't decide which removable storage device is right for your needs? With these products, you can use them all. The internal docking station from Exabyte's Eagle Division and the external line from MicroNet Technology let you share a drive among several PCs or swap different types of drives—Zip, Jaz, MO, tape, CD-R, hard disk, and more—in and out as needed.

BIRD OF MANY FEATHERS

The **Eagle TR-4i Nest** (\$90 street) is an IDE-based internal insert that works under Windows NT, Windows 3.x, and DOS. The Nest sleeve fits in a 5.25-inch drive bay; you insert a drive module through a swing door on the front and use a key to the right of the door to power the module on or off. When you lift the handle on the face of the module, it releases; simply pull on the handle to remove the drive.

Right now, the Nest can host Eagle's 1.44GB hard disk (\$375 street), an 8GB Travan tape drive (\$365 street), or a 100MB Iomega Zip Drive (\$230 street). An LS-120 module (\$230 street) will be available by the time you read this, and Iomega promises support for other storage solutions as they emerge.

In testing, we found the Nest to be a handy tool for sharing different types of storage devices. Its combination of modules and its relatively low cost make it ideal for small workgroups that need to share large files or

a single backup device. (Exabyte Corp., Eagle Division, Boulder, CO; 800-392-2983, 303-516-3000; www.exabyte.com. Circle 469 on reader service card.)

A similar concept, Removable Drive Solutions, from Houston-based Smart Storage Solutions (800-473-0923), was not ready in time for testing but should be available by the time you read this. The IDE frames (\$60 street) fit into a 5.25-inch drive bay and accept a range of hard disks, tape drives, and cartridge drives.

MOORING FOR A LUXURY YACHT

MicroNet's **DataDock** is a more robust solution. This SCSI-2-based product comes in one-, two- and seven-bay external models. Each bay is metal and includes a temperature control system equipped with a cooling fan and an audible alarm. DataDock supports a wider range of operating systems than the Nest, including Macintosh and

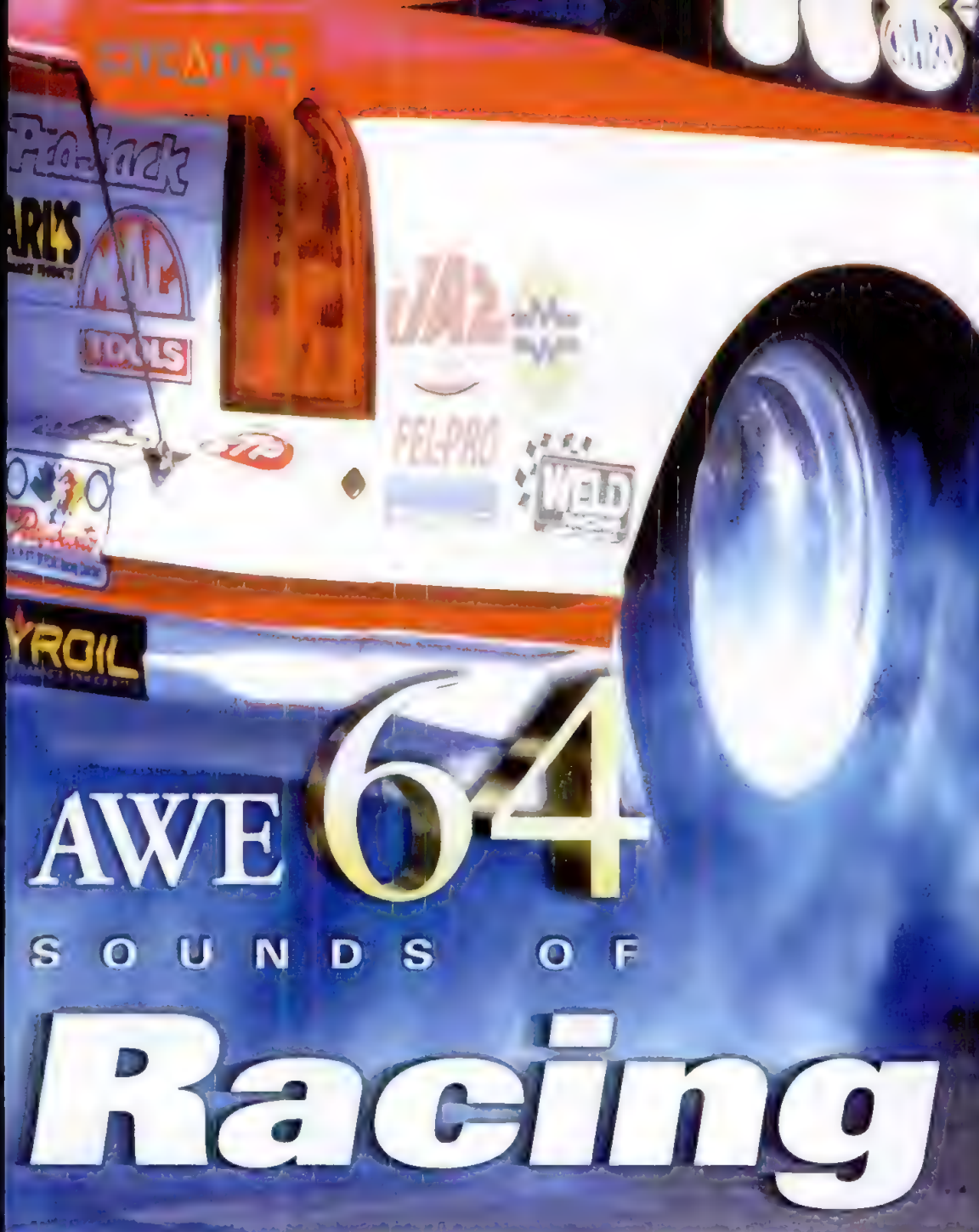
Unix, and offers a wider range of modules, including ultrawide SCSI hard disks ranging from 2GB to 9GB (\$635 to \$2,699 list), DAT drives (\$1,099 to \$2,285 list), optical drives (\$690 to \$2,145 list), and 4X and 2X CD-R drives (\$745 to \$1,345 list), as well as the Iomega Zip (\$299 list) and Jaz (\$545 list), the Seagate Cheetah in 2GB and 4GB capacities (\$2,567 and \$4,333 list), and the Sony AIT drive (\$5,699 list).

We examined the entry-level **DataDock Express** (\$189 list), which contains a single 3.5-inch bay, and the **DataDock 525** (\$785 list), which sports two 5.25-inch slots. The Express is aimed at users who need to share devices between machines, while the 525 and other multibay units target service bureaus and network administrators.

Its elegant design includes a locking system that prevents the drive from being removed while operating. Both the 2.6GB MO drive and the DAT drive slid into the bay and came online with equal aplomb.

Although docking bays add expense to your removable storage solution, this method offers the luxury of letting you to swap out or exchange multiple types of storage devices—an important option in the ever-evolving removable-storage market. Eagle's Nest and the DataDock both do the job. (MicroNet Technology Inc., Irvine, CA; 800-800-3475, 714-453-6060; www.micronet.com. Circle 470 on reader service card.)





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1. Cars Taking Off.
2. Breaks Screeching.
3. Hubcaps Scraping.
4. Crowd Cheering.
5. "Place Your Bets!"
6. Engine Seizing.
7. Hearts Pounding.
8. Refueling.
9. Wheels Peeling.
10. Breaths Of Anticipation.
11. "That Was A Close Shave."
12. Cars Colliding.
13. Backfires.
14. Engines Revving.
15. The Roar Of A Crowd.
16. Fiery Explosions.
17. Skidding Into The Pit.
18. Engine Problems.
19. Shrieks Of Excitement.
20. Vrrrrroooooom.
21. "Low Fuel!"
22. Jamming On The Brakes!
23. Gears Shifting.
24. Ambulance Siren.
25. Sighs Of Relief.
26. Engines Restarting.
27. Traction Of Bald Tires.
28. Crowd Going Wild.
29. "Last Lap!"
30. Starting Gun Firing.
31. Hubcaps Flying Across The Track.
32. Tires Blowing.
33. "Hurry! Fill 'Er Up!"
34. Engines Choking.
35. Tires Being Changed.
36. Nuts And Bolts Flying.
37. Grandstand Cheering.
38. Gears Grinding.
39. Slamming On The Brakes.
40. Turning Swiftly.
41. Pile-Ups.
42. Tires Rolling Off.
43. Skidding Uncontrollably.
44. Loud Screams.
45. Crowds Falling Silent.
46. Collision.
47. Thunderous Booms.
48. Deafening Cries.
49. Quick Turns.
50. Sudden Stops.
51. Reflex Braking.
52. "Gentlemen, Start Your Engines!"
53. Engines Sputtering.
54. Drop Of The Checkered Flag.
55. Head Gasket Exploding.
56. Hitting The Wall On Turn 3.
57. Chanting A Winner's Name.
58. Creaking Of The Chassis.
59. Radio Static.
60. Loosing Your Hood.
61. Accelerating Past The Finish Line.
62. Champagne Cork Popping.
63. Congratulatory Slaps.
64. Wizzing Past.

Removable Storage

than mounting the drive in a 3.5-inch bay and plugging in a cable and power connector. You won't find any software in the bundle, but you won't need any.

Performance is among the best of anything in its capacity range. The drive easily outdid the 230MB MO drives on almost all of our tests, and it was just a bit slower than SyQuest's EZFlyer 230 overall, though it was faster on some tests. Its performance on the video tests makes it a reasonable choice for playing video files.

Compared with SyQuest's EZFlyer 230 (our Editors' Choice in this class), the AR-3210NS is slower, has a lower capacity, and is more expensive. Its saving grace is that, according to Avatar, it should be available through several notebook vendors as an internal module option by this summer. That could make it a good choice for storing data files on your desktop, as well as those you like to take with you on the road.—MDS

Shark 250. Street price: \$300. Avatar Peripherals Inc., Milpitas, CA; 408-321-0110; www.goavatar.com. Circle 441 on reader service card.

Avatar AR-3210NS. Street price: \$300. Avatar Systems Corp., Milpitas, CA; 408-321-0110; www.avatarltd.com. Circle 441 on reader service card.

Fujitsu Computer Products of America Inc.

DynaMO 230 Portable PC Card Drive, DynaMO 640

Fujitsu is the leading maker of 3.5-inch MO drives worldwide, so we've included two offerings from the company's MO line. The DynaMO 230 Portable PC Card Drive (\$499 list) is a battery-powered 230MB MO drive aimed at notebook users looking for a portable storage solution with a capacity of around 200MB—for multimedia presentations on the road, for instance. The DynaMO 640 (\$659 list) is aimed at users who need an MO's low cost per megabyte in the 600MB-per-cartridge capacity range. Both drives hit their intended targets dead on, though the DynaMO 230 was slower than we had expected.

The palm-size DynaMO 230 Portable weighs in at 1 pound, complete with its battery pack. Add a few ounces for the included PC Card, cable, and AA batter-



ies (or AC adapter) and you have a drive that's not a burden to slip into your laptop case. Installation in Microsoft Windows 95 involves little more than plugging in the cable, popping in the PC Card, and following a few straightforward directions.

The DynaMO 230 Portable is pricey for its capacity, because MO drives are expensive and because the price includes such extras as the PC Card. But MO drives make up for their high initial price with a relatively low cost per megabyte for the disks. The current street price for 230MB disks is about \$10 apiece in bulk, about 4 cents per megabyte. The drive can read and write previous-generation 128MB MO disks.

Speed, however, is not this drive's strong suit. The PC Card interface appears to be the culprit, making this package even slower than the competing Olympus SYS.230. In fact, on our tests the DynaMO 230 Portable was the slowest drive in the 200MB category. Still, it dropped no frames on the AVI Video Playback Quality test, which means it should serve well for playing multimedia files.

The DynaMO 230 Portable is an acceptable if not impressive choice for its intended use—providing reasonably high-capacity removable storage in a portable system. It's particularly appropriate for those who already have 3.5-inch MO drives and need to shuttle files between desktop and notebook computers.

The DynaMO 640 is the first of a new generation of 3.5-inch MO drives. The 640MB disks offer enough capacity to back up the large partition of a typical hard disk. In addition, the drive is available in a 540MB disk version and also can read and write 230MB and 128MB disks.

If you have a SCSI board, installing the

SUITABILITY TO TASK

	DynaMO 230 Portable	DynaMO 640
Archiving and backup	Fair	Good
Data sharing and transport	Good	Good
Hard disk complement	Fair	Good
Compatibility	Good	Good

AT A GLANCE

Unformatted capacity	230MB	640MB
Cartridge cost/cost per MB	\$10, 4 cents	\$30, 5 cents
Sustained write	543 KBps	2,662 KBps
Sustained read	1,638 KBps	3,994 KBps

DynaMO 640 is simplicity itself. This external SCSI drive includes a power cord but no SCSI cable. Our Windows 95 system recognized the drive without a hitch. For backups, the package includes DataSaver, from Software Architects, which is most notable for the features it leaves out, such as any way to back up specific individual files. DataSaver is best ignored in favor of XCOPY or another backup program.

The good news is that the DynaMO 640 is an acceptable performer, though its timings on our 48MB Folder Backup and 88MB TIFF Copy tests trailed other MOs. But the combination of performance, capacity, and stability makes the DynaMO 640 a good choice for archiving and backup, as well as for secondary storage and for storing and playing multimedia files. And those who need to fill up many disks will appreciate the low cost per megabyte.—MDS

DynaMO 230 Portable PC Card Drive. List price: \$499. **DynaMO 640.** List price: \$659. Fujitsu Computer Products of America Inc., San Jose, CA; 800-626-4686, 408-432-6333, www.fcpa.com. Circle 442 on reader service card.

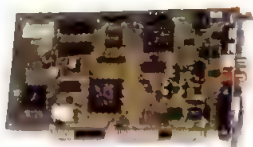
Hewlett-Packard Co.

HP SureStore Optical 2600fx Multifunction Disk Drive

Hewlett-Packard's HP SureStore Optical 2600fx Multifunction Disk Drive (\$2,995 list) is a 5.25-inch MO drive meant as a high-capacity desktop solution for data-intensive uses. This 2.6GB SCSI-based drive (2.1GB formatted, 1.06GB per side) is priced higher than others in its class, but for some the drive's versatility may offset this. The SureStore 2600fx can read and write both 2.6GB and 1.3GB WORM disks, rewrite 5.25-inch optical disks with either 1,024 or 512 sectors per

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EVEN BEFORE THE MMX™ PC MAGAZINE DECLARED



Featured Computer Artist: Wendy Grossman

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Ever since the news came out about the new Intel® Pentium® processor with MMX™ technology, savvy computer folk have been racing to get hold of it. After all, it's the best and fastest Pentium chip yet. MMX technology works wonders with multimedia, turns video into a life-changing experience, and even delivers richer Internet content. But which computer to buy? Well...ours. At least that's what *PC Magazine* thinks. In their review of twelve 200MHz systems, the Dell Dimension XPS M200s just won an Editor's Choice award for best business PC, and was named a price/performance leader. And in *PC Computing's* survey, the XPS – which they called "a multimedia powerhouse outfitted for business" – was judged the top performer (see graph). What can this mean? Probably just that in MMX technology, as in everything else, the race goes to the swift.



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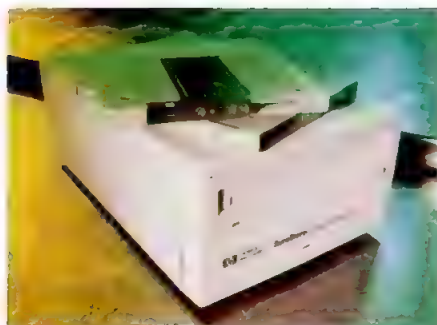
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Removable Storage



SUITABILITY TO TASK

	HP SureStore Optical 2600fx
Archiving and backup	Excellent
Data sharing and transport	Good
Hard disk complement	Good
Compatibility	Good

AT A GLANCE

Unformatted capacity	2.6GB
Cartridge cost/cost per MB	\$95/11cents
Sustained write	1,434 KBps
Sustained read	2,765 KBps

track, and read 600MB optical platters.

HP provides a SCSI terminator, a power cord, and one blank cartridge. The bundle also includes Formatter One software for both Microsoft Windows and Macintosh, but no SCSI cable. Installing the drive was easy on our test system, which already had an Adaptec 2940 SCSI adapter in place; we simply set the device ID on the back and plugged in the drive.

On the average, the drive emerged in the middle of the MO pack. It placed fourth among the nine SCSI MO drives on our Business Disk Winmark 97 and High-End Disk Winmark 97 tests. On our 85MB Folder Backup and Folder Restore tests the drive fared better, coming in fourth among MO devices and sixth among the 22 drives in the roundup.

The SureStore 2600fx is solid and well suited to its intended task, and the drive's compatibility is an added selling point for those who have data in legacy MO formats. For those who don't need the backward compatibility, however, other MO drives offer slightly better performance at a lower cost.—James Karney

HP SureStore Optical 2600fx Multifunction Disk Drive. List price: \$2,995. Hewlett-Packard Co., Greeley, CO; 800-826-4111, 301-258-2000; www.hp.com/go/optical. Circle 443 on reader service card.

Iomega Corp.

Zip Drive,
Jaz Drive

Iomega Corp. didn't invent the personal data-storage market, but the ubiquitous Zip Drive—with nearly 2 million units shipped in less than two years on the market—has put backup storage on many users' minds. We tested three Iomegas: the 100MB flexible-magnetic-media Zip Drive in external SCSI and external parallel-port versions (both \$150 street) and the 1GB magnetic-media Jaz Drive (\$500 street, external; \$400, internal).

Zip Drives are positioned specifically as inexpensive, personal storage devices. They don't claim to be as fast as the Jaz Drive or SyQuest Technology's SyJet, and their 100MB cartridge capacity is relatively small. Zip Drives are a snap to install and use, however, and they are much faster than LS-120 floppy disk drives.

The Jaz Drive hits its two-pronged target as a hard disk backup device and a fast auxiliary hard disk that supports multimedia playback.

Iomega has nurtured the Zip and Jaz drives, each available in internal and external versions, with connection choices that include user-supplied SCSI cards; optional, drive-specific Iomega SCSI cards; and parallel-to-SCSI adapters. Options include carrying cases and rechargeable battery attachments. Neither external SCSI drive includes a SCSI card as standard issue, but they do include Iomega Utilities: AppMover, Iomega Copy Machine, Iomega FindIt, and Iomega Watch.

For each drive, installation and setup were a quick process of making the proper connections and loading driver software. When we rebooted the system, it recognized the drive under Microsoft Windows 95 as another lettered drive.

TWO ZIPS IN EVERY DRIVEWAY

Limited by its 100MB single-disk capacity and relatively slow per-

formance, the Zip Drive is best suited for selective archiving, taking data on the road, storing (but not running) secondary applications, shuttling works in progress between office and home, and sharing data with others (where the huge installed base really pays off). Most any office will have a PC with a ZIP installed or attached (major PC and notebook vendors have been offering it as a \$139-list option). In case you don't want to take that chance, the 1-pound drive itself is easy to carry around, and the parallel-port model makes it easy to attach as needed.

In performance testing, the SCSI Zip Drive turned in moderate scores overall, but its Business Disk Winmark 97 and Business Winstone 97 scores were fairly low. Its abysmal performance on our AVI Video Playback Quality test means you definitely should look to another drive for multimedia files. The parallel-port Zip was slow on all tests, but its convenience may be worth the speed trade-off.

Judging the Zip Drive by its speed and disk capacity overlooks an important consideration. This bargain-priced, unpretentious drive installs quickly and easily, and its popularity means that you'll have a fairly easy time finding other Zip Drive users with whom to transfer data. Zip use

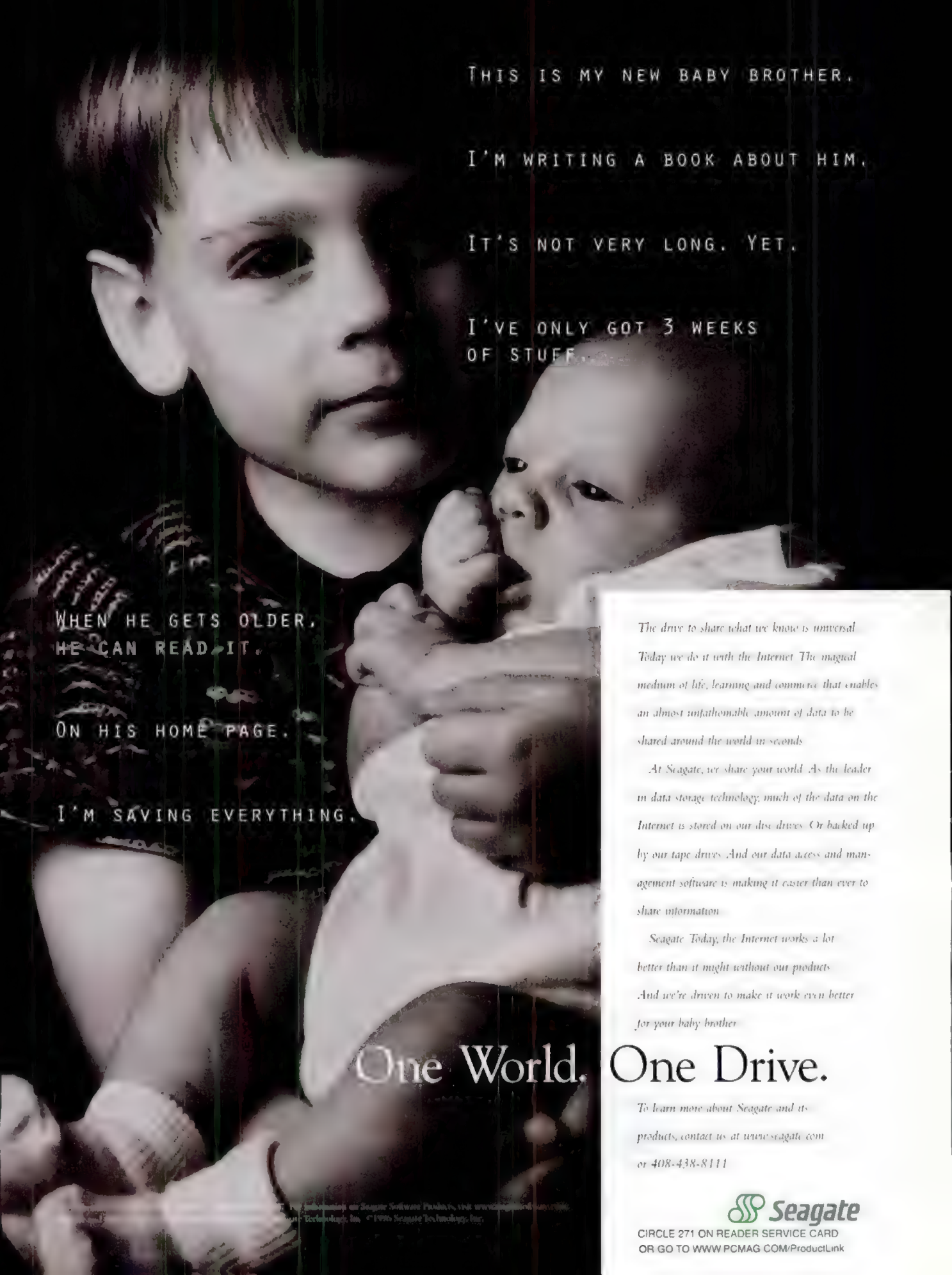


SUITABILITY TO TASK

	Zip Drive (SCSI)	Zip Drive (parallel port)	JazDrive
Archiving and backup	Fair	Fair	Excellent
Data sharing and transport	Excellent	Excellent	Excellent
Hard disk complement	Poor	Poor	Excellent
Compatibility	Fair	Fair	Fair

AT A GLANCE

Unformatted capacity	100MB	100MB	1GB
Cartridge cost/cost per MB	\$14.17¢	\$14.17¢	\$124.11¢
Sustained write	1,063 KBps	1,063 KBps	5,098 KBps
Sustained read	1,063 KBps	1,063 KBps	5,098 KBps



THIS IS MY NEW BABY BROTHER.

I'M WRITING A BOOK ABOUT HIM.

IT'S NOT VERY LONG. YET.

I'VE ONLY GOT 3 WEEKS
OF STUFF.

WHEN HE GETS OLDER,
HE CAN READ IT.

ON HIS HOME PAGE.

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PERFORMANCE TESTS

Removable Storage



In terms of capacity and performance, the drives we tested run the gamut. To make the best choice, you'll need to balance the benefits of not only speed but portability as well.

For this roundup we tested drives in four technology categories: hard magnetic, magneto-optical (MO), optical (PD and CD-R), and flexible magnetic (or floppy disk). Each technology uses different techniques to read and write data. Magnetic-type drives use only a magnetic head for both reading and writing data; MO drives use both a laser and a magnetic head to write data, while using only the laser to read the data; and optical drives use strictly optical technology to read and write the data.

Generally, magnetic-type drives (such as the Jaz, Nomai 540, and SyJet) performed better than the MO drives such as the Fujitsu DynaMO 640. The higher-capacity MO drives—which have higher disk rotation speeds and direct overwrite capabilities—were nearly as fast as the magnetic drives, however. By contrast, the PD and CD-R drives were notoriously slow, delivering transfer rates of only 1MB per second or less. Although the Zip Drive and the

M—Magnetic
O—Optical
MO—Magneto-optical
Bold type denotes first place within each category.

	AVI Video Playback Quality Frames dropped	85MB Folder Backup Minutes:seconds	88MB TIFF Copy Minutes:seconds	85MB Folder Restore Minutes:seconds	88MB Photoshop File Open Minutes:seconds
SCSI INTERFACE					
Avatar Peripherals AR-3210NS (M)	0	2:07	1:55	1:30	2:46
Fujitsu DynaMO 640 (MO)	0	3:46	3:30	0:57	2:12
HP SureStore Optical 2600fx (MO)	0	1:54	1:38	0:46	2:04
Iomega Zip Drive (M)	Fail	2:48	1:58	2:01	3:42
Iomega Jaz Drive (M)	0	1:31	1:15	0:35	1:47
Maxoptix T4-2600 (MO)	0	2:29	1:38	0:42	2:05
MDI SCSI Express 2600SL (MO)	0	1:30	1:07	0:42	1:51
Nomai 540 (M)	0	1:07	0:54	0:52	1:47
Olympus SYS.230 Universal (MO)	0	4:56	4:28	1:31	3:02
Olympus PowerMO 2600/SCSI (MO)	0	2:01	1:43	0:44	2:01
O.R. a:drive (M)	Fail	42:26	36:43	34:02	40:08
Panasonic PD Drive (O)	0	5:25	4:15	1:35	2:54
Pinnacle Micro Tahoe 640 MB (MO)	0	3:30	2:46	1:11	2:26
Pinnacle Micro Apex 4.6 GB (MO)	0	2:09	1:54	0:48	1:53
Sony Sprezza CSP-9411S (O)	N/A**	17:37	18:14	8:48	8:21
Sony CMO-R540-10 (MO)	0	1:42	1:26	0:56	2:14
SyQuest EZFlyer 230 (M)	0	1:58	0:58	1:06	2:15
SyQuest SyJet (M)	0	1:01	0:44	0:34	1:45
Toray Phasewriter DUAL (O)	100	5:34	4:19	1:35	2:51
Western Digital Caviar 32100 hard disk*	0	1:40	1:50	1:40	3:13
PARALLEL-PORT INTERFACE					
Avatar Peripherals Shark 250 (M)	0	3:54	2:43	2:38	3:53
Fujitsu DynaMO 230 Portable (MO)	0	14:14	8:17	2:02	3:42
Iomega Zip Drive (M)	Fail	15:27	11:30	23:57	28:49
Iomega Jaz Drive (M)	0	15:27	14:50	20:22	23:17
Nomai 540 (M)	111	3:21	2:24	2:36	38:22
Olympus SYS.230 Universal (MO)	60	5:14	4:29	2:30	4:08
Toray Phasewriter DUAL (O)	195	6:33	6:01	1:36	3:26
	◀ BETTER	◀ BETTER	◀ BETTER	◀ BETTER	◀ BETTER

* Reported for comparison N/A*—Not applicable. The product does not have enough capacity to run this test N/A**—Not applicable. The product is not suited to this task Fail. The product was unable to complete this test.

a:drive are both flexible magnetic drives, the Zip fared better than both the optical drives and the flexible magnetic a: drive.

What the Numbers Mean

Only three drives failed our AVI Video Playback Quality test, dropping frames while playing back the 320-by-240 Action Indeo-encoded AVI file. They were, however, drives from the slower-performing categories: the two flexible magnetic drives and the optical drive.

For the 85MB Folder Backup test and the 88MB TIFF Copy test, we performed two typical writing operations to the removable drives from Microsoft Windows 95 Explorer. The backup test involved copying a series of files, most under 1MB but a few as large as 21MB. As expected, the faster-spinning magnetic drives recorded the best times; however, the MDI SCSI Express

2600SL (an MO drive) delivered magnetic-disk performance on a par with that of the Jaz. The other high-capacity MO drives fell in with the lower-capacity magnetic drives, taking about 30 seconds longer to complete the backup. The flexible magnetic Zip Drive was the fastest of the drives with less than 650MB capacity. The slowest drive in the review, the a:drive, completed the task in just under 43 minutes; both optical drives recorded similar times. The results for the 88MB TIFF Copy tests correlated with those of the 85MB Folder Backup test, with the magnetic drives in the top tier, followed by the higher MOs, the optical drives, and the a:drive.

For the 85MB Folder Restore and 88MB Photoshop File Open tests, we executed two typical read-oriented tasks: restoring the 85MB folder from the removable drive to the hard disk, and opening an 88MB TIFF file from Photoshop. The SyJet and the Jaz Drive were top performers here, followed by the lower-capacity Nomai 540. The 2.6GB MOs finished only seconds behind the magnetic drives, followed by the 640MB MO drives and the SyQuest 230, all of which finished in the middle of the pack. And again, the optical drives ranked in the last quartile along with the Zip and the a:drive.

The Business Disk WinMark 97 suite—which stresses the drive's access time and caching performance—gives a good indication of performance under typical operations using business applications. Although efficient reading and writing throughput and fast access times will yield good results, we found that an optimal caching scheme will boost performance further. That's why the Olympus PowerMO 2600-SCSI with its 4MB of enhanced cache earned the top score, outperforming SyQuest's faster-spinning SyJet and Iomega's Jaz Drive, which have caches of only 512K and 256K, respectively. Sony's CMO-9540 has a 1MB cache buffer, which also contributed to its high performance; the drive outscored the fourth-place Jaz Drive by 7 percent and came in slightly behind the second-place SyJet. The Olympus and Sony MO drives outperformed the other MOs, thanks to their higher rotational speeds (3,600 revolutions per minute versus 3,000 rpm). The other 2.6GB MO drives as well as the lower-capacity magnetic drives scored 20 percent to 40 percent below the Olympus, while the throughput of the Zip and the lower-capacity MO drives was sometimes half that of the 2.6GB MO drives. The optical drives and the flexible magnetic a:drive turned in scores so low as to prove nearly unsuitable for the test.

The High-End Disk WinMark 97 test suite represents more demanding tasks, such as applications development and image editing. Not surprisingly, drives with large capacities and high rotational speeds yielded the highest scores; the Jaz beat out the SyJet by a slim 3 percent. The lower-capacity Nomai 540 fell shy of the 1GB magnetic-drive performers, but its high rotational speed enabled it to outperform the Olympus, Sony, and MDI 2.6GB direct-overwrite MOs. Although the mid-capacity magnetic drives kept pace with the high-capacity MO drives, there was a split between magnetic drives, with the Nomai coming in 25 percent faster than the SyQuest EZ Flyer. The weaker performers included the mid-capacity MO drives, trailed by the optical drives and the flexible magnetic a: drive.

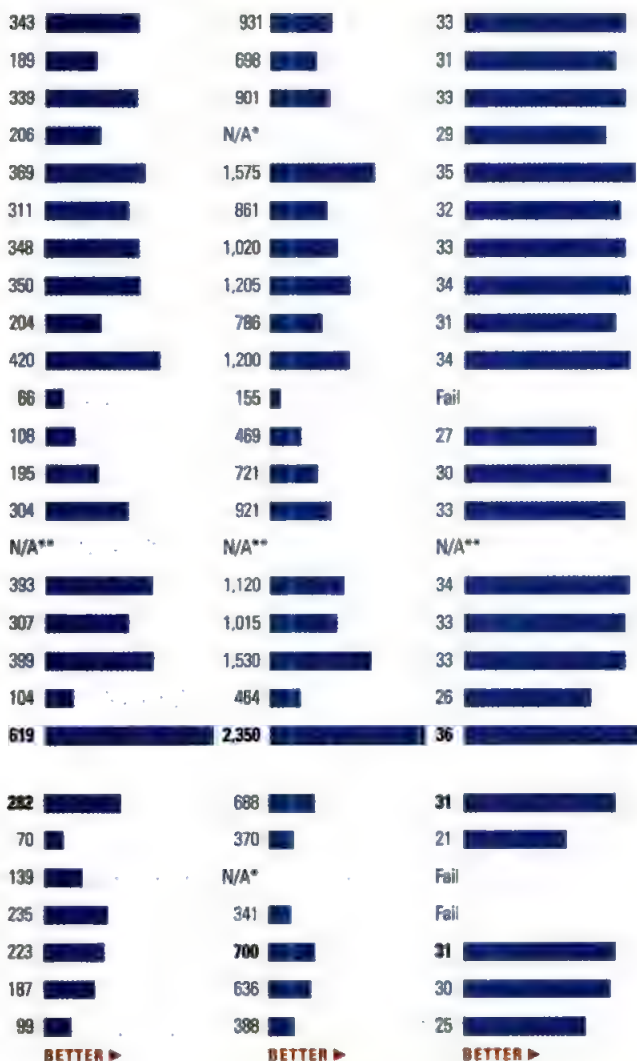
Since the operations in the Business Disk WinMark tests are based on the disk operations in the Business Winstone tests, the drives ranked similarly on both measures. Any differences might be the result of variations in the number of calls a drive makes to the CPU, or some faltering on kilobyte transfers.

In case you need a portable, six of these devices offer parallel-port interfaces, and Fujitsu's DynaMO 230 uses a PC Card interface. Of the seven, the Nomai 540 and the Shark 250 delivered the

**ZD Business
Disk WinMark 97**
Thousands of bytes/sec

**ZD High-End
Disk WinMark 97**
Thousands of bytes/sec

**ZD Business
Winstone 97**
Score



PERFORMANCE TESTS

best performance overall. The Nomai edged out the Shark on the bulk of the tests, with the exception of the AVI Video Playback Quality, and 88MB Photoshop File Open tests, which are CPU-intensive.—*Analysis by Denis Tom*

How We Tested

We ran all our CD-ROM benchmark tests on our standard Pentium/200-based Micron Millennia test-bed systems with 32MB of EDO RAM, 512K of L2 cache, a Western Digital Caviar 1.2GB hard disk with 128K of cache, and a Diamond Stealth 3D 2000 graphics adapter set at 800-by-600 resolution and 24-bit color. We tested the SCSI drives using an Adaptec AHA-2940AU—a PCI SCSI adapter—and tested the parallel-port drives set to ECP mode. We ran all tests under Windows 95 (4.00.950a) with Service Pack 1.

The **AVI Video Playback Quality** test (320-by-240 resolution, 30 fps, recorded at 300 KBps) measures the graphics, processor, and disk subsystem performance by counting the number of dropped frames during a 450-frame clip.

The **85MB Folder Backup** test shows the time it takes to copy 85MB of data (351 files in 61 folders) from the hard disk to the removable drive. To execute this test (as well as the subsequent two), we used the COPY and PASTE commands under the Edit menu bar in Windows 95 Explorer.

The **88MB TIFF Copy** test shows the time it takes to copy an

88MB TIFF file from the hard disk to the removable drive.

The **85MB Folder Restore** test indicates the time it takes to copy 85MB of data (351 files in 61 folders) from the removable drive back onto the hard disk.

The **88MB Photoshop File Open** test measures the time it takes to open an 88MB TIFF file stored on the removable drive in Adobe Photoshop. We stopped timing when all screen activity ceased and the arrow cursor appeared.

The **Business Disk WinMark 97** test suite, from ZD WinBench, shows the time each product takes to execute a series of file operations that reflect regular usage of eight popular business applications. The score is computed using a weighted harmonic mean of the throughputs for these applications in thousands of bytes (not kilobytes, or units of 1,024 bytes) per second.

The **High-End Disk WinMark 97** test suite shows the time required to execute a series of file operations that reflect the usage of six specialized, demanding applications, such as those used in image processing, applications development, and CAD/CAM. The score is computed using a weighted harmonic mean of the throughputs for these applications in thousands of bytes per second.

The **Business Winstone 97** test suite measures the level of performance typical business users will achieve while performing common operations with leading Windows-based business applications.

may become even more widespread as Iomega rolls out the new internal ATAPI version of the drive targeted at VARs, system integrators, and licensees.

ROCKING WITH JAZ

The step-up in Iomega's line from the Zip is the Jaz Drive. Its 1GB capacity and good performance make it suitable as a supplementary hard disk or a backup medium. An optional parallel adapter called the Traveller (\$50 street) even qualifies the 2-pound external Jaz as a portable data-transfer and backup device.

The Jaz, tested with a SCSI card, proved to be one of the fastest drives in this roundup. It performed in the top third on all our tests, and it came in first on the High-End Disk Winmark 97 test.

In addition to the Iomega Utility software bundle, the Jaz Drive includes DreamWorks' Escape from Horrorland Jaz Demo, which struts the drive's multimedia playback performance, plus a promotional program that shows how well the Jaz plays full-motion video clips with high-quality sound tracks. The Jaz Drive faces strong competition from the SyJet, a 1.5GB drive (also reviewed here), which is bigger and faster for the same price. But the Jaz's greater availability argues in its favor if you need to share data with other PC users.

Whether you choose the inexpensive Zip Drive to organize and store your programs and data or the Jaz Drive as a high-capacity, high-speed backup, or as a multimedia playback-capable hard disk complement, both these drives are fine choices.—*Bruce Brown*

Zip Drive. Street price: External SCSI, \$150; external parallel, \$150. **Jaz Drive.** Street price: External, \$500; internal, \$400. Iomega Corp., Roy, UT; 800-697-8833, 801-778-1000; www.iomega.com. Circle 444 on reader service card.

Maxoptix Corp.

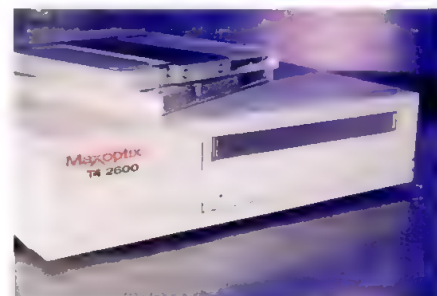
Maxoptix T4-2600

The Maxoptix T4-2600 (\$2,085 list, external; \$1,960 list, internal) is a 5.25-inch MO drive designed for document imaging, backup, and near-line storage. Its formatted cartridges each hold 2.1GB of data (1.06GB per side), and like virtually all newer MO drives, it can read and write older 1.3GB disks as well as read 650MB disks formatted on older MO devices. The drive is identical to the one that Maxoptix, a well-known player in the systems-vendor and vertical-applications arenas, installs in its line of MX520 optical servers and jukeboxes. Although not the fastest performer in the MO class, the drive's substantially lower

cost makes it worth consideration.

While the drive doesn't include a SCSI card, the external version does include a SCSI cable. Since the test system we used already had a SCSI card installed, setting up the drive took only a few minutes. The manual and installation guide are comprehensive and easy to follow.

The T4-2600 placed in the middle of the



SUITABILITY TO TASK

	Maxoptix T4-2600
Archiving and backup	Excellent
Data sharing and transport	Good
Hard disk complement	Good
Compatibility	Excellent

AT A GLANCE

Unformatted capacity	2.6GB
Cartridge cost/cost per MB	\$70, 2.7 cents
Sustained write	1,700 KBps
Sustained read	3,400 KBps

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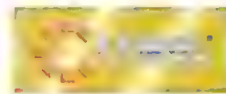
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Their 16X CAV Drives starts reading at 8X, and only reads at 16X at the end of the disc, a drive rating of 11.5X*



Our 12/20PleX CAV Drive starts reading at 12X, and reads at 20X at the end of the disc, a drive rating of 16.5X*

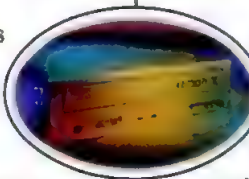
Introducing The 12/20PleX CAV CD-ROM Drive

The Only True 20X Max, 12X Minimum Performer.

True fact, the new Plextor 12/20PleX CD Drive does exactly what its name implies—reads at 12X on the inside of the disc and maxes at 20X on the outside. And does it with the same professional reliability you expect from Plextor. Nothing obscene there.

The other guy's so-called 16X CD Drive actually performs at 8/16X—reading 8X at the beginning of the disc and 16X only at the outside of the disc. For them to tell you otherwise is absolutely obscene. The critics at PC Magazine, Computer Shopper, NetGuide, PC Graphics & Video and PC World saw through it right away.

The Plextor 12/20PleX CD Drive also delivers an industry-leading average random access time of 95ms to improve multi-user/multi-tasking performance. Add transfer rates of 3MBps. Add MultiRead compatibility for worry-free use of the new generation of re-writable CD media and CD-R/W drives. Add superior 512K buffer manage-



ment to further enhance efficiency and reduce CPU utilization. Add improved performance when serving data, images or video over a network. Even pull CD-Audio off at high speed for faster multimedia creation.

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See why Plextor CD drives are tops in work-related purchases. And repeat purchases. Compare the Plextor 12/20PleX CD drive against any other drive's "X" rating. Hey, we'll even tell you where to get a CD-Tach benchmark test.

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HARDWARE

Removable Storage

SCSI MO pack on our Business Disk Winmark 97 tests, though it generally trailed the others on the remainder of our test suite. Closer examination of other products using the same drive technology indicated that Maxoptix might be using older versions of firmware.

Given the attractive price of this product, many users may be willing to forgo buying the fastest drive. Those who rely on Maxoptix for jukeboxes or other high-end products may opt for the security that comes with a single-service contract and known levels of support.—JK

Maxoptix T4-2600. List price: External, \$2,085; internal, \$1,960. Maxoptix Corp., Fremont, CA; 800-848-3092, 510-353-9700. www.maxoptix.com. Circle 445 on reader service card.

MicroDesign International Inc. **MDI SCSI Express 2600SL**

If you're looking for a good deal on a reliable storage solution, you can find the MDI SCSI Express 2600SL (\$1,995 list) from Micro Design International for as little as \$1,600 on the street, making it the lowest-cost 2.6GB MO in this roundup. Like other MO drives, the 2600SL is for users who need durable, transportable media for backing up and archiving large amounts of data and images. Each formatted cartridge holds 2.1GB of data, 1.06GB per side (as with the other 5.25-inch MOs here, you have to flip over the cartridge manually).

At 14 inches long and more than 10 pounds, the aluminum-encased external drive could not be called sleek, but its top is etched with a T-shaped groove for conveniently stacking multiple 5.25-inch MDI drives. While MDI does not include the SCSI host adapter, it does offer SCSI card configurations at different price points. Also available is MDI's SCSI Express storage management software (\$995 list) for OS/2, Mac, NetWare, or Microsoft Windows NT, although it is better suited to MDI's CD-ROM/optical jukeboxes.

The 2600SL, based on the Maxoptix T4-2600 drive also reviewed here, did well against the other MO contenders: It clocked the third-fastest time on the 85MB Folder Backup and 88MB TIFF Copy tests. The drive also placed in the top third on the Business Disk Winmark 97 and High-End Disk Winmark 97 tests.



SUITABILITY TO TASK

	MDI SCSI Express 2600SL
Archiving and backup	Excellent
Data sharing and transport	Good
Hard disk complement	Good
Compatibility	Excellent

AT A GLANCE

Unformatted capacity	2.6GB
Cartridge cost/cost per MB	\$120, 4.6 cents
Sustained write	3,400 KBps
Sustained read	3,400 KBps

The MDI drive's firmware, newer than that of the Maxoptix, supports direct overwrite (LIM-DOW), which lets the head pass over the targeted track area only once to complete a write operation, instead of using the slower, traditional two-pass method. The 2600SL is also backward-compatible with 1.3GB and 650MB two-pass MO cartridges.

Overall, the 2600SL is a good deal. Fast performance coupled with durable and reliable media makes this drive one of the better high-capacity solutions out there.—*Denis Tom*

MDI SCSI Express 2600SL. List price: External, \$1,995; internal, \$1,895. Micro Design International Inc., Winter Park, FL; 800-228-0891, 407-677-8333; www.mdi.com. Circle 446 on reader service card.

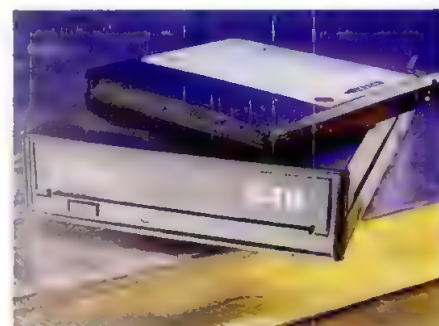
Nomai USA **Nomai 540**

It's fast, it's portable, and for \$350 (street, \$300 after rebate) you'll get 540MB of magnetic drive technology. The Nomai 540 is a 3.5-inch removable SCSI disk drive aimed at consumers who need more than 100MB or 200MB of storage but don't necessarily need an MO drive. Nomai also offers an internal model as well as a parallel-port version, and the drive is backward-compatible with 270MB SyQuest cartridges.

The compact drive is encased in a black aluminum shell that's a bit smaller than a VHS cassette tape; its cartridge is about the size of three stacked floppy disks. The bundle, weighing less than 3 pounds, includes a SCSI-to-parallel-port adapter, vertical feet to stand the drive on its edge, a power supply, and one 540MB cartridge.

First, a few caveats regarding the drive's installation. If you plan to use the faster SCSI interface, be prepared to buy a SCSI-2 cable with a 25-pin connector. The only SCSI IDs available to you are 1 and 5, but because there is no SCSI-out connector, you must set the drive as the last device on the SCSI chain. You'll also need to be extra careful installing the Shuttle Connection, a parallel-to-SCSI adapter cable; its unlabeled 25-pin connectors caused us to connect the wrong ends of the cable to the drive and the computer, which resulted in the system not detecting the drive on the software installation.

Since the drive uses Winchester technology and a SCSI interface, its performance was excellent. The Nomai 540 was a close second behind SyQuest's SyJet in our 85MB Folder Backup and 88MB TIFF Copy tests. The Nomai drive was also in the top tier on our Business Disk Winmark 97 and High-End Disk Winmark 97 tests. The drive's parallel port was one of only two to give chase to the



SUITABILITY TO TASK

	Nomai 540
Archiving and backup	Good
Datasharing and transport	Good
Hard disk complement	Excellent
Compatibility	Fair

AT A GLANCE

Unformatted capacity	540MB
Cartridge cost/cost per MB	\$50, 9.3 cents
Sustained write	3,000 KBps
Sustained read	3,500 KBps

Removable Storage

top-performing parallel-port version of the Jaz Drive.

The Nomai 540 is a top performer in the midcapacity class, and a good solution for those who will easily outgrow drives with capacities of around 200MB. If you don't want to pay for higher capacity you don't need, consider the Nomai.—*DT*

Nomai 540. Street price: \$350 (\$300 after rebate). Nomai USA, Boca Raton, FL; 800-556-6624, 408-562-3970; www.nomai.com. *Circle 447 on reader service card.*

Olympus America Inc.

Olympus SYS.230 Universal, Olympus PowerMO 2600/SCSI

Some MO drive manufacturers build only 5.25-inch drives; others build only 3.5-inch drives. Olympus America offers both. The Olympus SYS.230 Universal (\$390 street, external; \$300 street, internal) is a 230MB 3.5-inch drive meant for users who need removable media in roughly 20MB chunks for backup, archiving, or secondary storage. The external configuration will appeal to road warriors. The Olympus PowerMO 2600/SCSI (\$1,800 street) is a 5.25-inch drive aimed at high-volume imaging, archiving, and retrieval.

We tested the external SYS.230, which includes both a SCSI cable and a cable to let this SCSI drive plug into a parallel port. A nice touch for the cable is a pass-through parallel port so you don't have to relinquish the printer port. The drive's parallel or SCSI connection option, along with its compact 2-pound weight, makes this drive particularly well suited both for notebook use and for shuttling between two machines. Fujitsu's competing DynaMO 230 Portable, however, weighs a pound less than the SYS.230 and can run on batteries.

To install the drive for a SCSI port in Windows 95, we simply plugged in the power cord and the SCSI cable and booted up the system (ours already had a SCSI card installed). Installing the drive via parallel port was only marginally more difficult; we needed to tell Windows to add a SCSI device and use the disk provided.

Performance depends on the type of



connection you opt for. As a SCSI drive, the SYS.230 was faster on our tests than Fujitsu's DynaMO 230 Portable, and it handled the video tests well. But as a parallel-port drive, it lagged behind Fujitsu's drive on many tests and dropped enough video frames to make it a questionable choice.

You'll get better performance from the less expensive Avatar drives we reviewed, or from SyQuest's EZFlyer 230, both of which use magnetic media. The SYS.230, however, offers reasonably good performance for its capacity, and unlike magnetic media, its MO disks can store files reliably for decades. With the MO cartridges selling for \$10, the SYS.230 can be less expensive overall than drives with a lower initial price but more costly disks.

The PowerMO 2600 offers most of the strengths of its lower-capacity cousin, with the same ease of installation (for SCSI only—there is no parallel-port option), reliability for long-term storage, and similar low cost per megabyte. Where the PowerMO 2600 breaks away from the SYS.230 is in its much greater capacity and speed. The 1.06GB per side is enough to serve as primary storage or to back up a large disk partition. Performance was impressive, helped along by the 4MB intelligent cache. The PowerMO 2600 was unmatched on the Business Disk Winmark 97 tests, and it was beaten only by drives with magnetic media on the High-End Disk Winmark 97 tests.

All told, the PowerMO 2600 fits nicely in its intended niche for high-volume, removable, long-term storage—particularly for digital photos and medical or legal records, and for users who need to save data over extended periods for time.—*MDS*

SUITABILITY TO TASK

	SYS.230 Universal	PowerMO 2600/SCSI
Archiving and backup	Good	Excellent
Datasharing and transport	Good	Good
Hard disk complement	Good	Good
Compatibility	Fair	Excellent

AT A GLANCE

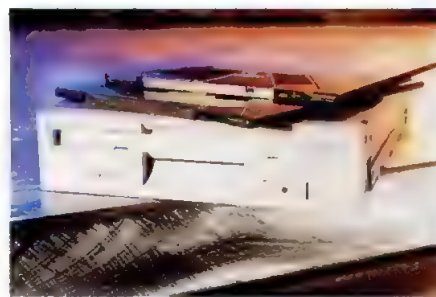
Unformatted capacity	230MB	2.6GB
Cartridge cost/cost per MB	\$10, 4.3 cents	\$90, 3.5 cents
Sustained write	516 KBps	900 KBps
Sustained read	1,433 KBps	3,002 KBps

Olympus SYS.230 Universal. Street price: external, \$390; shuttle cable, \$59.95. **Olympus PowerMO 2600/SCSI.** Street price: \$1,800. Olympus America Inc., Melville, NY; 800-347-4027, 516-844-5000, www.olympus.com. *Circle 448 on reader service card.*

O.R. Technology Inc.

a:drive

Looks can be deceiving. The a:drive from O.R. Technology resembles a standard 3.5-inch floppy disk drive. But thanks to LS-120 technology (developed by Compaq, 3M, and drive giant MKE), the drive can cram 120MB of data onto an LS-120 disk, and it can read and write standard floppy disks. The drive is affordable (\$190 street), yet currently it's used primarily by system integrators in lieu of a traditional floppy disk drive in new systems. For configuration and performance reasons, the a:drive is better



SUITABILITY TO TASK

	a:drive
Archiving and backup	Fair
Data sharing and transport	Fair
Hard disk complement	Poor
Compatibility	Good

AT A GLANCE

Unformatted capacity	120MB
Cartridge cost/cost per MB	\$12, 10 cents
Sustained write	450 KBps
Sustained read	450 KBps

Visit your reseller or see
www.iomega.com



INSTANT ACCESS

Access time: 15.5-17.5ms

Seek time: 10ms read/12ms write

Sustained transfer rate:

6.62MB/sec. max

MTBF: 250,000 hrs.

TRANSPORTABLE FILES

Portable 1-gigabyte disks

10-year estimated shelf life

Drive supports PC and Mac:

DOS, Mac, OS/2, Windows 3.1, 95*
and NT*, IRIX**, and Solaris**

Interface options:

Jaz® Jet™ SCSI PCI \$99

Jaz Jet SCSI ISA \$89

Jaz Traveller Parallel Port \$49

Jaz PCMCIA Card \$125

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SUMMARY OF FEATURES

Removable Storage Devices

PC MAGAZINE
EDITOR'S CHOICE

■ YES ■ NO

In alphabetical order by company

	Avatar Peripherals Shark 250	Avatar Systems Avatar AR-3210NS	Fujitsu DynaMO 230 Portable PC Card Drive	Fujitsu DynaMO 640	HP SureStore Optical 2600fx Multifunction Disk Drive	Iomega Zip Drive	Iomega Jaz Drive	Maxoptix T4-2600
Street price of internal unit/external unit	N/A†, \$300	\$300, N/A†	N/A†, \$500*	N/A†, \$660*	N/A†, \$3,000*	\$150, \$150	\$400, \$500	\$1,960, \$2,085*
Unformatted capacity of single cartridge (without compression)	250MB	210MB	230MB	640MB	2.6GB	100MB	1GB	2.6GB
Weight of external unit	0.5 pounds	N/A†	1 pound	3.5 pounds	8 pounds	1 pound	2 pounds	9 pounds
Dimensions of external unit (HWD, in inches)	1.0 x 3.5 x 5.5	N/A†	1.0 x 4.4 x 6.4	2.1 x 6.6 x 9.9	3.9 x 6.5 x 11.0	1.5 x 5.4 x 7.1	1.0 x 4.0 x 6.0	2.5 x 9.6 x 10.3
Storage technology	Hard disk	Hard disk	Magneto-optical	Magneto-optical	Magneto-optical	Flexible media	Hard disk	Magneto-optical
Other compatible formats	None	170MB Avatar	128MB MO	540MB MO, 230MB MO, 128MB MO	1.3GB MO, 650MB MO	None	None	CCW, 1.3GB MO, 650MB MO
Form factor	2.5-inch	3.5-inch	3.5-inch	3.5-inch	5.25-inch	5.25-inch	5.25-inch	5.25-inch
Interface type	Parallel	Fast SCSI-2	PC Card	SCSI	SCSI-2	SCSI-2	Fast SCSI-2	SCSI
Other interfaces available	None	IDE	None	None	None	Parallel	Parallel	None
Host adapter included	None	None	PC Card	None	None	None	None	None

Media and Rated Performance

Uses industry-standard media	■	■	■	■	■	■	■	■
Price of media/Cost per MB	\$40, 6 cents	\$40, 19 cents	\$10, 4 cents	\$30, 5 cents	\$95, 11 cents	\$14, 14 cents	\$124, 12.4 cents	\$70, 2.7 cents
Data buffer size on drive	128K	128K	2K	2K	1MB	256K	256K	1MB
Rated average access time/average seek time	12 ms, 12 ms	12 ms, 12 ms	46 ms, 65 ms	76 ms, 35 ms	35 ms, 25 ms	29 ms, 20 ms	12 ms, 12 ms	39 ms, 39 ms
Rated average sustained write rate	1,250 KBps	2,100 KBps	543 KBps	2,662 KBps	1,434 KBps	1,063 KBps	5,098 KBps	1,700 KBps
Rated average sustained read rate	1,250 KBps	2,100 KBps	1,638 KBps	3,994 KBps	2,765 KBps	1,063 KBps	5,098 KBps	3,400 KBps

Reliability

Verifies read after write	■	■	■	■	■	■	■	■
Bad sector reallocation on read/on write	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Rated mean time between failures (hours)	100,000	100,000	27,000	27,000	100,000	100,000	250,000	100,000
Rated read/write cycles for media	Unlimited	Unlimited	Info not available	Info not available	10 million	Info not available	Info not available	100 million
Rated shock resistance for media cartridge (in case)	36-inch fall	36-inch fall	Info not available	Info not available	Info not available	Info not available	Info not available	Info not available
Rated shock resistance for media cartridge (not in case)	24-inch fall	24-inch fall	Info not available	Info not available	Info not available	1,000 g	36-inch fall	Info not available
Rated shock resistance for drive (nonoperating)	150 g	150 g	Info not available	50 g	Info not available	7 g	3 g	40 g
Data recovery service for damaged media	■	■	■	■	■	■	■	■
Estimated life of media (years)	10	10	30	30	100	10	10	50

Software and Support

Windows 95, NT, 3.x drivers	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
OS/2 Warp, DOS, Macintosh drivers	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Recognized as a logical drive	■	■	■	■	■	■	■	■
Partition editor provided	■	■	■	■	■	■	■	■
Bootable/Caching software included	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Cost for tech-support call (under warranty)	Cost of call	Cost of call	Free	Free	Cost of call	\$14.99 per incident	\$19.95 per incident	Free
Live tech-support hours (eastern time)	11:00-8:00 M-F	9:00-8:00 M-F	8:00-8:00 M-F	8:00-8:00 M-F	7:00-8:00 M-F	8:00-8:00 M-F	8:00-8:00 M-F	11:00-8:00 M-F
Web site	www.goavatar.com	www.avatarltd.com	www.fcpc.com	www.fcpc.com	www.hp.com/go/optical	www.iomega.com	www.iomega.com	www.maxoptix.com

N/A†—Not applicable: The product does not come in this configuration.

* List price; the vendor does not cite a street price.

suited for this than for use as an end-user add-on.

The a:drive requires special support in the computer's BIOS for it to be used as a boot device. New systems include this support, but older machines may require a special controller card with on-board support to make the drive work. Even with this support, there are limitations; you can boot to certain operating systems such as Microsoft Windows 95 with the high-capacity disks, but with standard floppy disks you can boot

only to DOS. The Windows 95 version (OSR/2) and Windows NT 4.0 version include Plug and Play support for the drive, but earlier versions require additional drivers.

Once we installed the a:drive, we found that it's more akin to a floppy disk drive than a hard disk—in more ways than one. The performance is slow; the a:drive trailed every other device in this roundup on every test by a wide margin. That said, the slow performance may not be a major problem for some users, depending on

their intended application. If you want to store data only in 100MB chunks for archival or transport purposes, the drive may be adequate. The medium resembles a standard 3.5-inch floppy disk, so it should stand up to typical handling in the mail system.

If you think of the a:drive as a replacement for the floppy disk drive (which, after all, is its avowed function), you'll be glad it succeeds in providing increased storage capacity in the same form factor as a regular floppy disk drive. But if you

component that is already integrated into a new computer system. It is much less appealing as an aftermarket add-on. —*Alfred Poor*

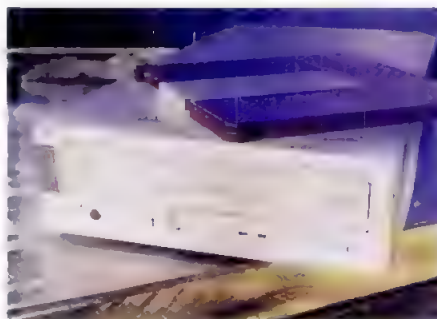
a:drive. Street price: \$190. O.R. Technology Inc., Campbell, CA; 408-866-3000; www.ortechology.com. *Circle 449 on reader service card.*

Panasonic Computer Peripheral Co.

Panasonic PD Drive

The Panasonic PD Drive packs a 650MB read/write capacity into a drive the size of a standard CD-ROM drive, and it is intended to provide easy removable storage for end users. The drive uses phase-change technology, in which a laser heats the data layer to specific temperatures to alter the layer's reflectivity and store data on proprietary cartridges. The PD Drive offers the added benefit of being able to read standard CD-ROMs at quad speed (but not write them—this is not a CD-R drive). In testing the external model (\$600 street), we found that the PD Drive is not as fast as some of the MO drives out there, but its dual functionality makes it a good choice for some users.

Installation and configuration were a snap, with all the switch settings clearly marked on the back of the housing (you'll have to provide your own SCSI card). Mi-



SUITABILITY TO TASK

	Panasonic PD Drive
Archiving and backup	Excellent
Data sharing and transport	Fair
Hard disk complement	Good
Compatibility	Good

AT A GLANCE

Unformatted capacity	650MB
Cartridge cost/cost per MB	\$30, 4.6 cents
Sustained write	600 KBps
Sustained read	978 KBps

Microsoft Windows 95 sees the device as two separate drives, and it assigns one letter to the read/write phase-change function and another to the CD-ROM function. The package includes Corel SCSI software, which delivers handy utilities.

Like MO, the phase-change cartridges have a shelf life of at least 30 years and an attractive storage cost per megabyte of about 4 cents. The 650MB capacity is excellent for backups of large, partitioned hard disks.

In terms of raw performance, the PD Drive is only about half as fast as MO drives of similar capacity. On the other hand, it was fast enough to handle video clip playback without dropping frames, and its Business Winstone 97 score fell within 10 percent of the MO drive scores, which indicates that the differences may be less pronounced in some applications.

While the PD Drive isn't suitable as a hard disk replacement, it is an excellent hard disk complement for backup and near-line storage tasks. Its CD-ROM drive functionality makes it an attractive alternative to plain CD-ROM drives, and Compaq, IBM, and other vendors offer systems that replace CD-ROM drives with PD drives. Furthermore, Panasonic's parent company, Matsushita, plans to provide backward compatibility with the PD media in its future DVD-RAM drives. So while the PD Drive tops the charts neither for capacity nor for performance, its versatility and reasonable cost may make it the right choice for you.—AP

Panasonic PD Drive. Street price: External \$600; internal, \$500. Panasonic Computer Peripheral Co., Secaucus, NJ; 800-742-8086, 201-348-7000; www.panasonic.com/alive. *Circle 450 on reader service card.*

Pinnacle Micro Inc.

**Tahoe 640 MB,
Apex 4.6 GB**

Pinnacle Micro has two MO drives in this roundup, and each one is targeted at a different consumer audience. The Tahoe 640 MB (\$699 list, external; \$599 internal) is a 3.5-inch MO designed for single users as a backup or near-line storage device. The Apex 4.6 GB (\$1,995 list, external) is targeted as an expansion to existing single-user hard disk storage or as a convenient way to store a copious

consider the drive as an add-on for removable storage, the competition in this field is fierce. For less money, another drive (especially Iomega's Zip) can offer more widely accepted media, with better performance, and be easier to set up as an add-on unit. Mitsumi and Swan Instruments are preparing other floppy disk drive replacements that will offer 130MB capacity, floppy disk compatibility (though not LS-120 compatibility), and allegedly better performance.

The a:drive makes more sense as a

SUMMARY OF FEATURES

Removable Storage Devices

■ YES ■ NO

In alphabetical order by company

	Olympus PowerMO 2600/SCSI	O. R. a:drive	Panasonic PD Drive	Pinnacle Micro Tahoe 640 MB	Pinnacle Micro Apex 4.6 GB	Sony Spressa CSP-9411S	Sony SDT-2000E	Sony CMO-R540-10
Street price of internal unit/external unit	N/A†, \$1,800	\$190, N/A†	\$500, \$600	\$600*, \$700*	\$1,900*, \$2,000*	\$600, \$800	\$1,060*, N/A†	\$2,495*, \$2,900*
Unformatted capacity of single cartridge (without compression)	2.6GB	120MB	650MB	640MB	4.6GB	650MB	2GB	2.6GB
Weight of external unit	4 pounds	N/A†	5.5 pounds	2 pounds	5.5 pounds	9 pounds	N/A†	11.5 pounds
Dimensions of external unit (HWD, in inches)	4.0 x 8.0 x 5.0	N/A†	2.3 x 6.1 x 12.5	1.5 x 4.4 x 8.2	2.9 x 8.4 x 10.6	2.8 x 8.3 x 11.4	N/A†	2.8 x 8.3 x 11.5
Storage technology	Magneto-optical	LS-120	Phase-change	Magneto-optical	Magneto-optical	CD-R	DDS tape	Magneto-optical
Other compatible formats	CCW, 1.3GB MO, 650MB MO	1.44MB and 720MB floppy disks	CD-ROM	230MB MO, 128MB MO	CCW, 2.6GB MO, 2GB MO	CD-ROM	DDS-1 media	1.3MB MO, 650MB MO
Form factor	5.25-inch	3.5-inch	5.25-inch	3.5-inch	5.25-inch	5.25-inch	3.5-inch	5.25-inch
Interface type	SCSI-2	ATAPI IDE	SCSI-2	Fast SCSI	Fast SCSI-2	SCSI-2	SCSI-2	SCSI-2, Fast SCSI
Other interfaces available	None	None	Parallel	Parallel	None	None	None	None
Host adapter included	None	None	None	None	Fully SCSI-compliant adapter	None	None	None
Media and Rated Performance								
Uses industry-standard media	■	■	■	■	■	■	■	■
Price of media/Cost per MB	\$90, 3.5 cents	\$12, 10 cents	\$30, 4.6 cents	\$60, 9.3 cents	\$170, 3.7 cents	\$10, 1.5 cents	\$15, 1.8 cents	\$80, 3 cents
Data buffer size on drive	4MB	8K	256K	512K	1MB	1MB	1MB	1MB
Rated average access time/average seek time	34 ms, 26 ms	107 ms, 65 ms	195 ms, 165 ms	43 ms, 35 ms	23 ms, 21 ms	250 ms, 250 ms	25 sec., N/A†	33 ms, 25 ms
Rated average sustained write rate	900 KBps	450 KBps	600 KBps	1,020 KBps	1,200 KBps	300 KBps	366 KBps	1,500 KBps
Rated average sustained read rate	3,002 KBps	450 KBps	978 KBps	3,070 KBps	Varies	600 KBps	366 KBps	3,000 KBps
Reliability								
Verifies read after write	■	■	■	■	■	■	■	■
Bad sector reallocation on read/on write	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	N/A†	■ ■
Rated mean time between failures (hours)	50,000	5,000	30,000	60,000	150,000	150,000	200,000	100,000
Rated read/write cycles for media	1 million	500,000	500,000	Info not available	500,000	Info not available	1,000	1,000,000
Rated shock resistance for media cartridge (in case)	Info not available	Info not available	Info not available	Info not available	Info not available	Info not available	Info not available	Info not available
Rated shock resistance for media cartridge (not in case)	Info not available	Info not available	Info not available	Info not available	Info not available	Info not available	Info not available	Info not available
Rated shock resistance for drive (nonoperating)	45 g	Info not available	Info not available	5 g	Info not available	Info not available	Info not available	88 g
Data recovery service for damaged media	■	■	■	■	■	■	■	■
Estimated life of media (years)	40	Info not available	30	30	30	10	25	100
Software and Support								
Windows 95, NT, 3.x drivers	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
OS/2 Warp, DOS, Macintosh drivers	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Recognized as a logical drive	■	■	■	■	■	■	■	■
Partition editor provided	■	■	■	■	■	■	■	■
Bootable/Caching software included	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Cost for tech-support call (under warranty)	Free	Free	Free	Cost of call	Cost of call	Free	Free	Free
Live tech-support hours (eastern time)	8:00–8:00 M–F	10:00–8:30 M–F	24 hours M–F	10:30–7:30 M–F	10:30–7:30 M–F	7:00 A.M.–10:00 P.M. M–F; 10:00–6:00 Sat.	7:00 A.M.–10:00 P.M. M–F; 10:00–6:00 Sat.	7:00 A.M.–10:00 P.M. M–F; 10:00–6:00 Sat.
Web site	www.olympus.com	www.ortechology.com	www.panasonic.com/alive	www.pinnaclemicro.com	www.pinnaclemicro.com	www.sony.com/technology	www.sony.com/technology	www.sony.com/technology

N/A†—Not applicable: The product does not come in this configuration.

N/A††—Not applicable: This product is a tape drive. * List price; the vendor does not cite a street price.

amount of shared data.

We found the Tahoe relatively easy to install and configure (you'll need your own SCSI adapter). It requires an external SCSI terminator, bundled with the kit, but you'll have to supply the media yourself. It does ship with Disc Archive 95, a backup utility that appears better suited for CD-R use. A more traditional backup utility might make better sense.

One of the drive's biggest strengths is its ability to accept older 3.5-inch MO

media. It can read 128MB disks, and it can read and write 230MB disks. These other sizes are popular in a number of markets—law offices, multimedia development, graphic arts, imaging—which makes the drive a convenient upgrade for those with legacy data. It also uses LIM-DOW media, which permit the drive to erase and write in a single pass.

Our testing revealed the drive to be a bit too slow for practical use as a hard disk replacement; rather, it is best suited for

backup and near-line storage. Some users may find its ability to read legacy MO media to be the swing factor in its favor.

THE APEX OF CAPACITY

If high capacity and low cost per megabyte are of prime interest, the Apex 4.6 GB deserves attention. The drive was originally announced 18 months ago, when the best mainstream PCs sported 1.2GB hard disks and MO capacity had just hit 2.6GB. Even though the Apex was a year late in coming

Removable Storage

Ends

PC MAGAZINE
EDITORS' CHOICEPC MAGAZINE
EDITORS' CHOICEToray
Phasewriter
DUALSyQuest
EZFlyer 230

SyQuest SyJet

650MB

N/A, \$230

\$400, \$500

\$350, \$450

230MB

1.5GB

650MB

1.5 pounds

1.5 pounds

8 pounds

1.6 x 5.4 x 7.3

1.6 x 5.4 x 7.3

2.4 x 8.3 x 10.6

Hard disk

Hard disk

Phase-change

SyQuest EZ135

None

CD-ROM

3.5-inch

3.5-inch

5.25-inch

Fast SCSI

Fast SCSI

SCSI-2

Parallel

IDE, parallel

Parallel

None

None

Fully SCSI-compliant adapter

\$30, 13 cents

\$125, 8.3 cents

\$40, 6 cents

256K

\$12K

256K

18 ms, 13 ms

17 ms, 12 ms

165 ms, 190 ms

2,000 KBps

5,630 KBps

600 KBps

2,000 KBps

5,630 KBps

870 KBps

200,000

250,000

30,000

Unlimited

Unlimited

500,000

30-inch fall

30-inch fall

Info not available

30-inch fall

30-inch fall

Info not available

3 g

3 g

Info not available

30

30

30

Cost of call

Cost of call

Free

8:30 A.M.-10:00 P.M. M-F

8:30 A.M.-10:00 P.M. M-F

7:00-5:00 M-F

10:30-8:00 S, S

10:30-8:00 S, S

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internal termination and well-marked settings. Included with the package is a 16-bit Adaptec SCSI adapter and the EZ-SCSI bundle of utilities. As of this writing, Pinnacle Micro has begun including the Seagate Backup utility, but it was not part of our testing package. The Apex also accepts 5.25-inch MO cartridges of various capacities, such as standard 2.0GB and 2.6GB disks.

The drive is nearly half as fast as a high-speed hard disk, making it a viable candidate for full-time data storage duty. Its capacity permits backing up a huge hard disk in one pass, even if it's set up as a single partition. At this time, the drive's only competition is magnetic tape, though in the near future DVD-RAM technology will likely spur drives with comparable capabilities.—AP

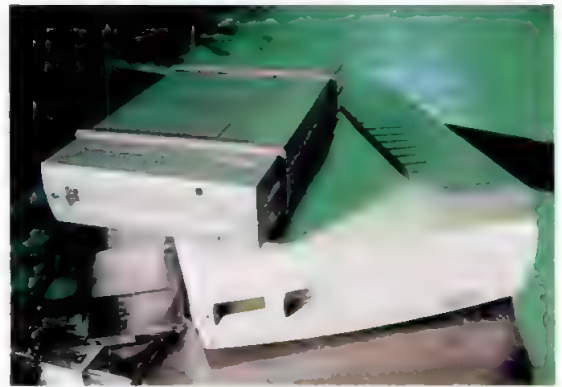
Tahoe 640 MB. List price: External, \$699; internal, \$599. **Apex 4.6 GB.** List price: External, \$1,995; internal, \$1,895. Pinnacle Micro Inc., Irvine, CA; 800-553-7070, 714-789-3000, www.pinnaclemicro.com. Circle 451 on reader service card.

Sony Electronics Inc.

Spressa CSP-9411-S, Sony SDT-2000E, Sony CMO-R540-10

Sony is one of the biggest names in storage, with a product line that includes a range of technologies. For this roundup, we tested the Sony CMO-R540-10, a 5.25-inch MO drive (\$2,900 list, external; \$2,495 internal) to see how it compared with offerings from other MO vendors. To illustrate how CD-R and tape options stack up against the rewritable cartridge drives in this review, we also tested Sony's Spressa CSP-9411-S, a CD-R drive (\$799 external, \$599 internal), which was an Editors' Choice in our February 4, 1997, roundup, as well as the popular Sony SDT-2000E, a DAT drive (\$1,059 internal).

Tape drive technology is designed for a single purpose: to back up large amounts of data. Tape drives are not fast,



SUITABILITY TO TASK

	Tahoe 640 MB	Apex 4.6 GB
Archiving and backup	Excellent	Excellent
Data sharing and transport	Good	Fair
Hard disk complement	Good	Excellent
Compatibility	Good	Fair

AT A GLANCE

Unformatted capacity	640MB	4.6GB
Cartridge cost/cost per MB	\$80, 9.3 cents	\$170, 3.7 cents
Sustained write	1,020 KBps	1,200 KBps
Sustained read	3,070 KBps	Varies

but they offer the least expensive storage solution—about a penny per megabyte. Sony's newest tape drives are aimed at power users and network operators. Using metallic tape similar to the tape found in Hi-8 camcorders, these DDS units store up to 24GB of files on a 4-mm data cartridge.

The Sony SDT-2000E packs up to 1.3GB of compressed data onto a 60-meter tape (\$13), and it packs 2GB compressed on 90-meter tape (\$16). Don't expect a lot of extras with the SDT-2000E. The box includes the drive, a SCSI cable, and an installation manual; we had to provide our own SCSI-2-compatible host adapter and backup software. Setting the tape drive up on our Windows NT 4.0 workstation took about 15 minutes.

Just how long a given backup or restore operation is likely to take depends on several factors, such as the complexity of the file system, the size of the backup, the location of the desired files, and the type of software you are using. Copying a large hard disk and comparing the results against the original data can take over 2 hours. With a full tape, it takes about 25 seconds to locate an individual file; how much time it takes to recover the file varies, depending on the location of the

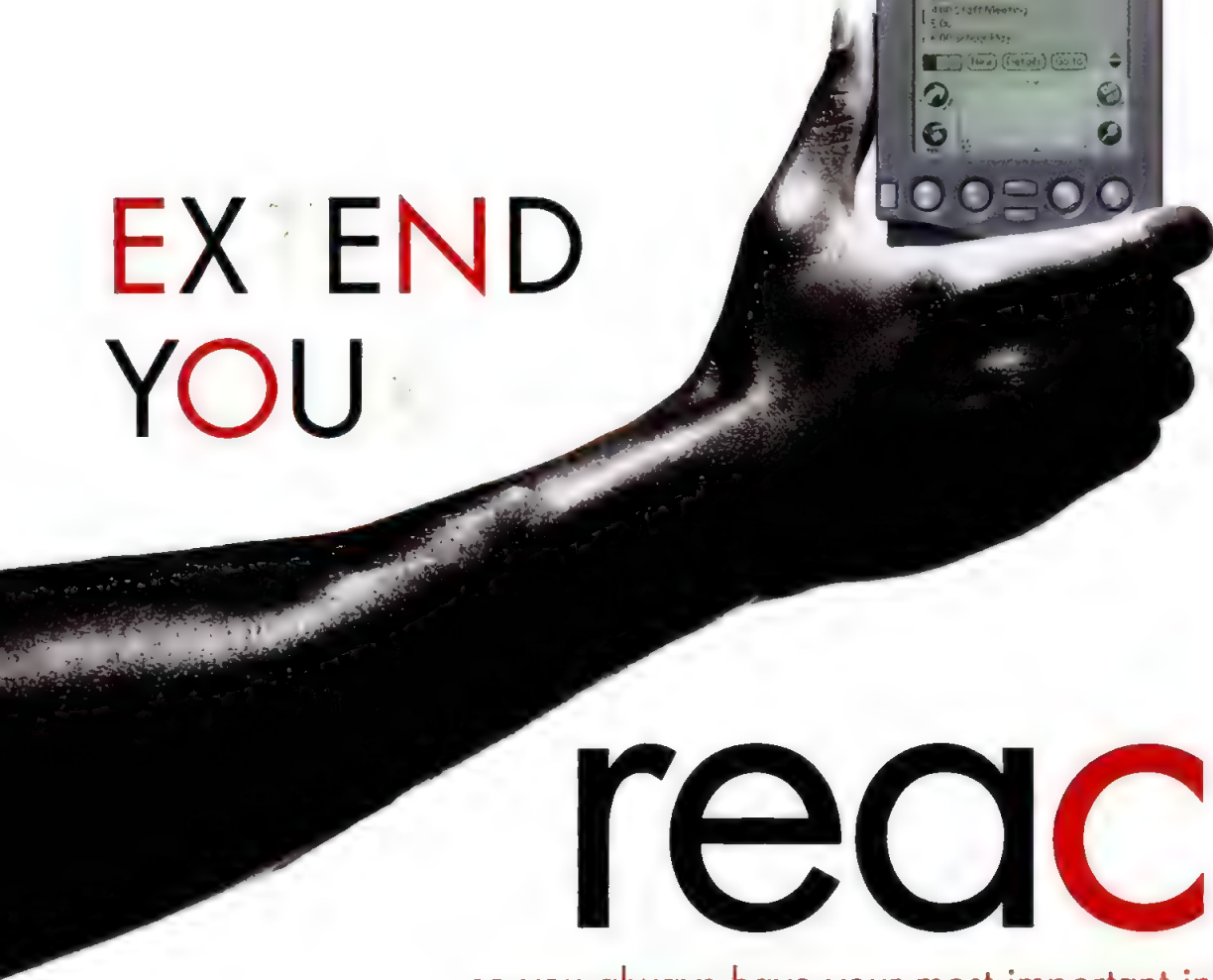
to market (and current hard disk capacities make its 4.6GB less breathtaking), it is still quite a technical feat.

The drive uses dual-sided 5.25-inch proprietary magneto-optical disks (2.3GB per side)—each the equivalent of seven CD-ROMs. Such capacity makes it well suited for just about any application requiring massive amounts of data: near-line storage, network backup, video manipulation, archiving, and so on.

The Apex was easy to set up, thanks to



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Twice the memory



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file and the tape length.

Although tape is sluggish compared with even the slowest MO, ZIP, or CD-R drive, none of tape's competitors can store as much information in such a compact space. As long as users treat files on tape as backups or archives and don't expect fast near-line access, these Sony drives offer tangible benefits.

SPRESSA CD-R

The Spressa CSP-9411-S is a 2X-record, 4X-read CD-R drive that lets you burn 650MB worth of data onto a CD-R disk. The drive's large capacity makes it well suited for backup tasks; nevertheless, because CD-ROM drives are nearly ubiquitous, this is also an excellent method for data and image distribution.

The Spressa includes a SCSI cable and Adaptec's CD-Creator for disk mastering; you need to provide the SCSI-2-compatible host adapter. The drive installed easily under a Windows 95 test-bed, and we used Sony's own CD-RFS (Compact Disk-Recordable File System) program for our tests. CD-RFS employs packet-writing technology, which lets users write small amounts of data without traditional file management overhead. The result is a device that acts like a hard disk or floppy

disk drive, so you can drag and drop a file onto a CD-R disk instead of mastering the disk with a special program.

As expected, the CD-R drive could not compete during our timed tests. It needed over 17 minutes to complete our 85MB Folder Backup test (compared with about 5 minutes for the Panasonic PD Drive and 4 minutes for the Fujitsu DynaMO drives). But here again, to focus on performance is to miss the point. The Spressa offers good capacity, affordable storage (about 2 cents per megabyte), and one distinct advantage: You can create disks that can be read by just about every PC user, thanks to the ubiquitousness of CD-ROM drives. If you want to share multimedia files or digital images, CD-R may be the best bet.

MULTIFUNCTION MO

The Sony CMO-R540-10 is a well-designed MO drive that can write 5.25-inch 2.6GB MO and WORM cartridges, as well as older 1.3GB media. It sports a 1MB S-cache and can hold 1.06GB of data on each side of a formatted cartridge. The drive is a good solution for second-line storage, either on standalone PCs or in optical jukeboxes, and it is also marketed in third-party systems minus the Sony label.

Packaged with the drive is a SCSI terminator, a power cord, a 2.6GB cartridge, and a spare air filter for the fan; Formatter One software for both Windows and Macintosh comes bundled with the drive. You have to provide a SCSI-2 host adapter and the SCSI cable. Setup for the drive was uneventful. The manuals are clear, covering the main points effectively.

On our tests, the Sony CMO-R540-10 scored consistently near the head of the pack and generally came in second among MO drives. It placed third overall on our Business Disk WinMark 97 tests and second among MOs. This drive meets its objective, providing reliable re-

movable storage and backup data.—*JK Spressa CSP-9411-S*. List price: External, \$799; internal, \$599. *Sony SDT-2000E*. List price: \$1,059. *Sony CMO-R540-10*. List price: External, \$2,900; internal, \$2,495. Sony Electronics Inc., San Jose, CA; 800-352-7669, 408-432-0190. www.sony.com/technology. Circle 452 on reader service card.

SyQuest Technology Inc.

EZFlyer 230, SyJet

SyQuest Technology has been playing the role of Avis to Iomega's Hertz for a couple of years now, and a close look at SyQuest's offerings shows that its work has paid off. The EZFlyer 230 (\$230 street) and SyJet (\$500 street) are removable magnetic-media drives that work well as backup devices and supplementary hard disks. The EZFlyer 230 stresses low cost and ease of use, and it's targeted at the mass market. The high-performance SyJet is intended for application professionals, particularly those in publishing and design. Both top their better-known Iomega competitors in performance and are compelling values.

Neither drive comes with a SCSI card, but they both include connection cables. In addition to installation software, SyQuest Utilities, and the SyBack backup program, each drive includes three bonus titles loaded on the cartridge that ships with the drive: Triazzle, an animated living-puzzle brain teaser from Berkeley Systems; Zip Zap, a guide to cities, postal codes, area codes, time zones, and population statistics; and Alta Vista Technology's Howdy!, which lets you construct multimedia postcards bundled with runtime players to send via e-mail.

The EZFlyer 230 comes in three versions, which all have the same price. In addition to a parallel-port version, two SCSI versions come with different cables; one comes with a small SCSI-2 connector (which we tested), and the other comes with a 25-pin connector so the same drive can be used with PCs and Macintosh computers (you cannot use the same media with the two operating systems, though). In addition, the EZFlyer 230 is backward-compatible with 135MB media from the drive's previous version.



SUITABILITY TO TASK

	Spresa CSP-9411-S	Sony SDT-2000E	Sony CMO-R540-10
Archiving and backup	Good	Excellent	Excellent
Data sharing and transport	Excellent	Fair	Good
Hard disk complement	Poor	Poor	Good
Compatibility	Excellent	Poor	Good

AT A GLANCE

Unformatted capacity	650MB	2GB	2.6GB
Cartridge cost/cost per MB	\$10.15 cents	\$15.08 cents	\$80.3 cents
Sustained write	300 KBps	366 KBps	1,500 KBps
Sustained read	600 KBps	366 KBps	3,000 KBps

HARDWARE

Removable Storage



Performance test results for the EZFlyer 230 proved it to be quite speedy. Although this drive isn't in the same performance class as the SyJet or Iomega Jaz Drive, the EZFlyer easily outpaced its archival, the Iomega Zip Drive. It placed in the middle of the pack on our Business Disk WinMark 97 and High-End Disk WinMark 97 tests, and it was generally about a minute faster than the Zip Drive in storing and retrieving large files. And unlike the Zip Drive, the EZFlyer didn't drop any frames on our AVI Video Playback Quality test, making it appropriate for playing even full-motion video files.

FLYING THE CONCORDE

The external SCSI SyJet we tested attained the best scores overall on our tests. The SyJet and the often-compared Iomega Jaz Drive are both fast drives, with roughly similar Business Disk WinMark 97, High-End WinMark 97, and Business Winstone 97 scores. Despite the similar price and performance of the SyJet and the 1GB Jaz Drive, the SyJet's larger 1.5GB capacity gives it a strong advantage. A parallel-port version is available for \$530, and what it gives up in speed it makes up for in convenience, as you can have a portable 1.5GB storage device that weighs only 1.5 pounds.

The SyJet is optimized for multimedia applications, with a minimum 3.7-MBps sustained transfer rate and 512K cache, so it's likely that the professional design and graphics market—SyQuest's traditional customer base—will buy this newer drive from the familiar brand name.

High performance, ease of use, and good value characterize both SyQuest drives. Compared with the 100MB Iomega Zip Drive, the EZFlyer 230 is significantly faster and packs over twice the capacity. Still, the Zip's popularity makes it a better

choice if you want to share files with others. For the same price as the Jaz Drive, the SyJet delivers faster performance and 50 percent greater capacity. The SyQuest name should make the SyJet a staple in graphic-arts service bureaus. And even if you never send files out for processing, the SyJet's speed and capacity make it a terrific candidate as a general-purpose high-speed auxiliary hard disk.—BB

EZFlyer 230. Street price: External, \$230. **SyJet.** Street price: External, \$500. SyQuest Technology Inc., Fremont, CA; 800-245-2278, 510-226-4000, www.syquest.com. Circle 453 on reader service card.

Toray Optical Storage Solutions Phasewriter DUAL

The Phasewriter DUAL (\$449 list, external; \$349 internal) is based on the same Matsushita phase-change (PD) dual mechanism as the Panasonic PD Drive—but with some important differences. The Phasewriter's external device has a SCSI interface, but the kit also includes a SCSI-to-parallel adapter, making it more flexible for end users. The added versatility is handy, but with any device enabled by a parallel port there's always a performance price to pay.

Installation on a SCSI port is a snap under Windows 95. On our tests, the parallel-port connection posed problems until we realized that you must adjust the system's CMOS settings to configure the parallel port as either an ECP or EPP high-speed bidirectional port; after that, installation proceeded smoothly.

The Phasewriter driver assigns one drive letter to the phase-change read/write cartridge functions and another letter to the drive's 4X CD-ROM read capability. The package also comes with the Seagate Backup utility, Adobe Acrobat Reader, and Netcom NetCruiser Web browser.

SUITABILITY TO TASK

	EZFlyer 230	SyJet
Archiving and backup	Good	Excellent
Data sharing and transport	Excellent	Good
Hard disk complement	Good	Excellent
Compatibility	Fair	Poor

AT A GLANCE

Unformatted capacity	230MB	1.5GB
Cartridge cost/cost per MB	\$30, 13 cents	\$125, 8 cents
Sustained write	2,000 KBps	5,630 KBps
Sustained read	2,000 KBps	5,630 KBps

Performance was predictable; with a SCSI connection, the drive produced numbers only slightly slower than the Panasonic model, which is to say about 10 percent behind competing MO drives. The parallel-port connection exacted a toll on speed, dropping the Phasewriter to third-from-last place on our Business Disk WinMark 97 tests. On our 85MB and 88MB

read/write tests, the drive's timings were quite acceptable for a parallel device. The drive performed poorly, though, on our AVI Video Playback Quality test under both SCSI and parallel-port connections.

The parallel port is convenient and makes the drive useful as a backup device that can be shared among several PCs in an office.

PD technology has the distinct advantage of being supported by DVD-RAM, so your investment in media will be protected. Overall, the Phasewriter DUAL makes a flexible choice for single-user backup and near-line storage.—AP

Phasewriter DUAL. List price: External, \$449; internal, \$349. Toray Optical Storage Solutions, San Mateo, CA; 800-867-2973, 415-341-7152, www.toray.com. Circle 454 on reader service card.



SUITABILITY TO TASK

	Phasewriter DUAL
Archiving and backup	Excellent
Data sharing and transport	Fair
Hard disk complement	Good
Compatibility	Good

AT A GLANCE

Unformatted capacity	650MB
Cartridge cost/cost per MB	\$40, 6 cents
Sustained write	800 KBps
Sustained read	870 KBps

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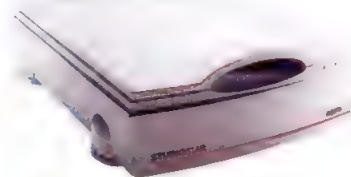


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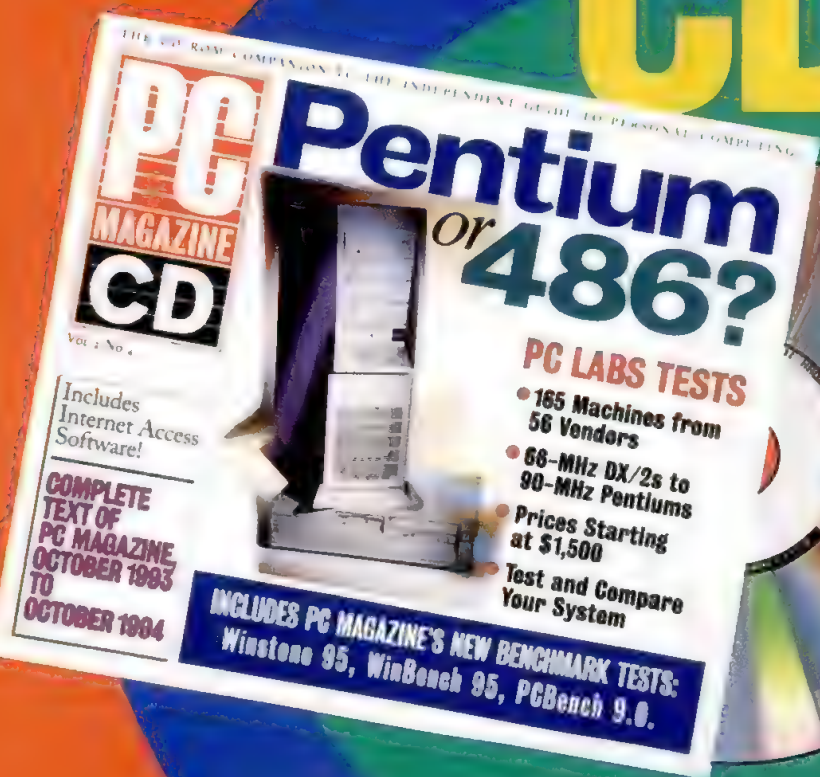
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By Kathy Yakal

Accounting programs for small businesses are getting more powerful and easier to use. What more could you ask for?

What a difference a decade makes! Ten years ago, you would have paid many thousands of dollars for an accounting package that offered the depth of features common in today's inexpensive programs. Today, for \$200 or less, you can do a lot more than balance the books. And you can do it all by yourself. Depending on the complexity of your organization, you may want help setting up your accounts. But you may not need that. Many of the small-business accounting programs we review here are built for novices.

But can you trust an inexpensive accounting program to follow the same rules that accountants must? In a word, yes. Many of these products maintain ironclad audit trails. They also help you to meet many of the basic requirements for maintaining a general ledger and processing transactions and reports that the folks with the green eyeshades do, so that your books will be in good order. And with many products in this

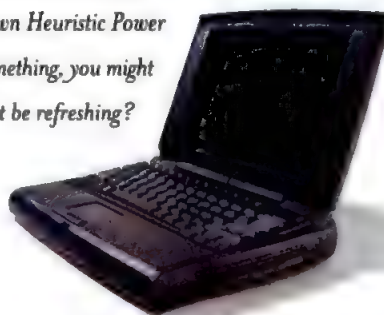
IN THIS REVIEW

Big Business for Windows 2.0	205
DacEasy Accounting & Payroll for Windows 95 3	206
DacEasy Instant Accounting 2.1	209
Great Plains Profit 2.10	209
M.Y.O.B. Accounting 7.0	212
One-Write Plus 6.0	212
Pacioli 2000 4.1	215
Peachtree Complete Accounting for Windows 4.0	216
Peachtree First Accounting 2.0 for Windows	218
QuickBooks Pro 5.0 for Windows	218
Simply Accounting for Windows 5.0	220



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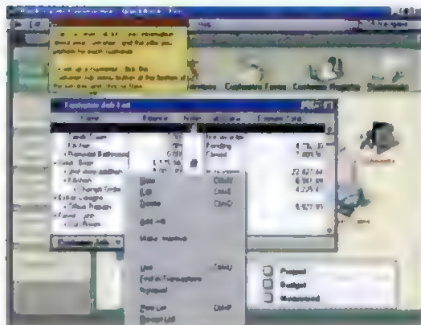
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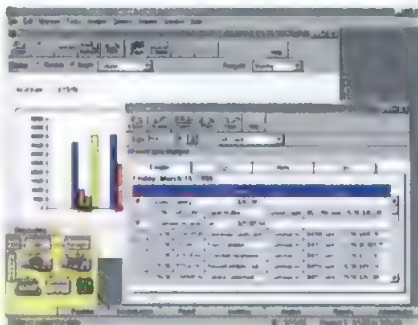
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Beyond Bookkeeping

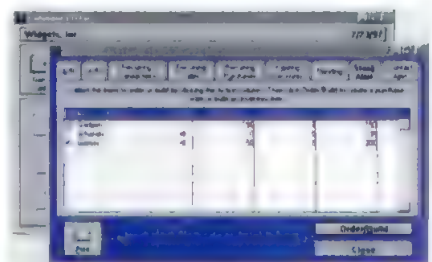
Today's small-business accounting package offers some big-time features. These products strike a balance between bookkeeping power and ease of use. Here are a few of their high points.



Shortcuts abound in QuickBooks Pro. Here, clicking the Customer:Job button at the bottom of the customer list pulls up an option menu. This may be user-interface overkill, but at least you can use QuickBooks the way you like and you'll never get lost. Also shown is one of the program's ubiquitous "Cue Card" tips.



Peachtree Complete Accounting goes beyond the norm in many ways, providing, for example, reporting tools to help managers anticipate future bottom lines and plan accordingly via features like this Cash Forecast graph. The Action Items list reminds users of pending financial tasks.



M.Y.O.B. Accounting's to-do list offers nine windows to help you stay on top of key facets of your business, such as receivables, payables, and inventory. Designed for businesses with stock items, M.Y.O.B. includes useful inventory-tracking features. The Stock Alert window displays items that have fallen below minimum stocking levels and lets you generate purchase orders and build new items.

class adding sophisticated features such as job costing, you can expect today's small-business accounting program to grow with your company.

TIME AND MONEY

A small-business accounting program can help you save time (once you've mastered it) by storing your records neatly in assigned places and integrating them. And it can save you money by reminding you of pending discounts and flagging overdue invoices. The products at which we looked are weakest in their handling of inventory, but they all help you keep a closer accounting of products you sell.

In the area of data import, these packages also fall short: The process is often problematic, and most products import only .QIF (Quicken Interchange Format), TimeSlips time-billing software, and/or ASCII—if they import at all.

When you're ready to go beyond bookkeeping, these programs can help you keep your finger on the pulse of your small business, something difficult to do with a manual accounting system. Small-business packages come with dozens of

reports on income and expenses. Several of the products we review let you drill down to view the underlying transactions.

BEYOND THE BASICS

This group varies widely in capabilities and competence. We looked at 11 packages that provide the basic functions necessary in an accounting system: general ledger, accounts receivable and payable, inventory, and payroll. Some add functions such as job costing and tracking and fixed assets management. Certain programs, such as One-Write Plus (recently acquired by Peachtree Software) and Peachtree First Accounting 2.0 for Windows, are best for very small businesses, whereas workhorses Peachtree Complete Accounting for Windows and QuickBooks Pro 5.0 for Windows can handle more complexity. (We also reviewed Big Software's Big Business for Windows, DacEasy Accounting & Payroll for Windows 95, DacEasy Instant Accounting, Great Plains Profit, BestWare's M.Y.O.B. Accounting, M-USA Business Systems' Pacioli 2000, and Simply Accounting for Windows.)

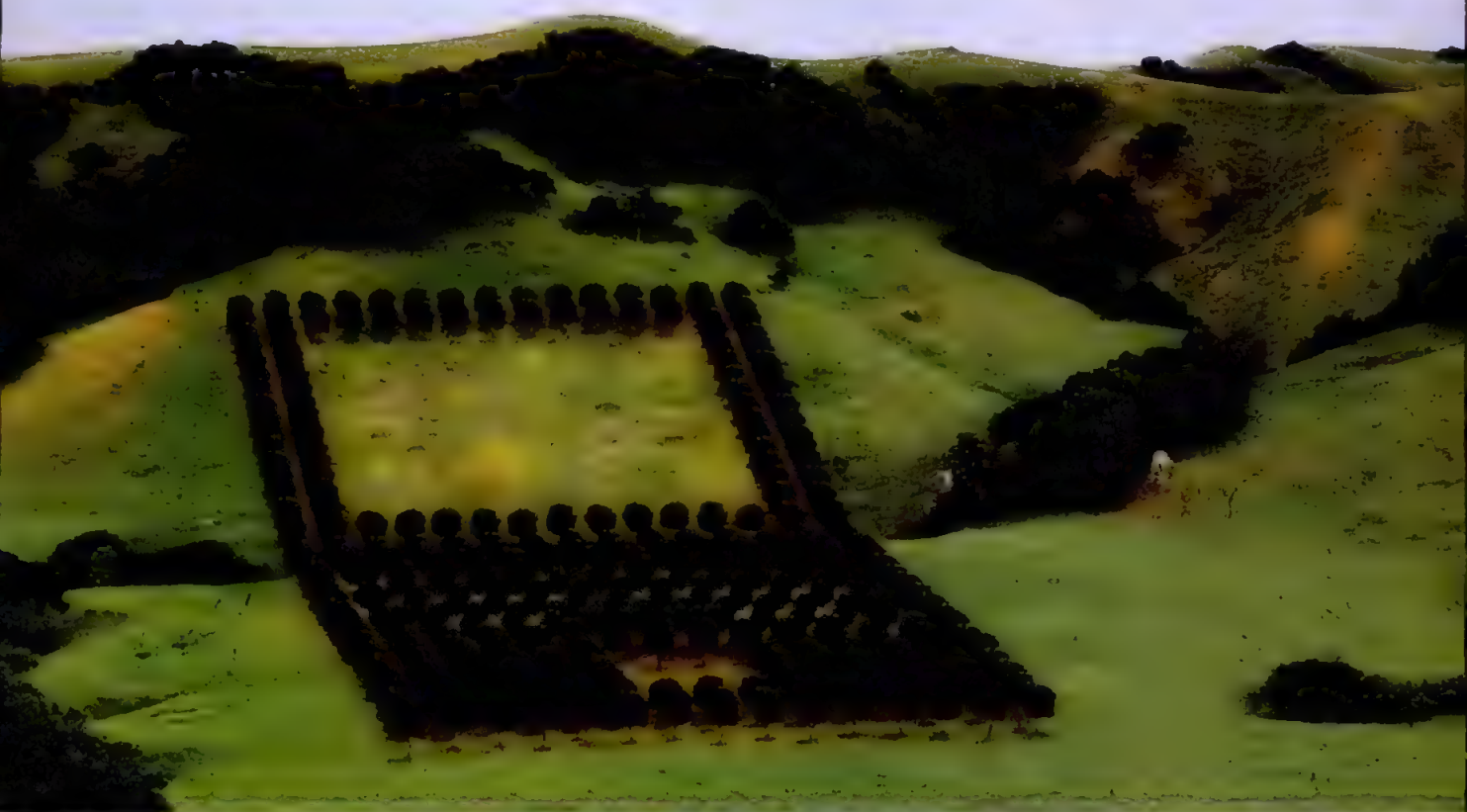
Two products we did not evaluate deserve mention. Central Technologies (800-456-4123, www.centraltech.com) is about to release an upgrade to Do It Yourself Accounting for Windows. The current release, 5.0 (\$200 street), contains standard core modules plus estimating and job tracking. The next version, called Versa Pro Accounting for Windows, should be available in the fall and will be a true 32-bit product with links to two Internet commerce sites.

We decided not to include Proven Edge, formerly CashGraf Business Plus, from CashGraf (888-877-6836, www.provenedge.com), because it is more expensive than the other products we saw, at \$599 list, including inventory and payroll features. Proven Edge includes a word processor and a contact manager that, although built upon the product's database, make it function more as a suite of applications than as a dedicated accounting program.

Small-business accounting products have been slow to venture online. Peachtree Complete has a companion electronic bill payment program, *e-Check*, and QuickBooks now provides online banking and bill paying, but they're the only two accounting products to offer such functionality. Big Business can generate an HTML-based product catalog, though,

Our Contributors: KATHY YAKAL, WILL FASTIE, and TOM WHITE are freelance writers. JOHN MORRIS was the associate editor in charge of this story, and technical director BEN Z. GOTTESMAN was the project leader.

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Echos Pro Notebook Standard Features:

Pentium® processor, PCI Bus, 256K L2 cache, 16MB RAM expandable to 128MB, 28.8K internal modem, 2 PC Card slots with PC Card Bus and Zoomed Video, Win 95 keyboard, Li-Ion battery, Multi-function bay: 8X CD-ROM (std.), modular FDD (std.) and second HDD (opt.)

Echos Pro 150S

150MHz Pentium® processor, 12.1" SVGA TFT display, 2.1GB Removable HDD



\$3,999

Echos Pro 133S

133MHz Pentium® processor, 12.1" SVGA TFT display, 2.1GB Removable HDD



\$3,499

Echos Pro 133D

133MHz Pentium® processor, 12.1" SVGA DSTN display, 1.3GB Removable HDD



\$2,999



The optional Echos™ Pro Docking System offers full port replication, Multi-function bay, drive bay, 2 PCI Card slots, plus much more. It's the perfect solution for desktop replacement.



**Echos
P133S**

Echos Notebook Standard Features:

Pentium® processor, PCI Bus, 256K L2 cache, 1.3GB removable HDD, Multi-function bay: 6X CD-ROM (std.), modular FDD (std.) and second battery (opt.)

Echos P133S

133MHz Pentium® processor, 16MB RAM expandable to 40MB, 11.8" SVGA TFT display

\$2,399

Echos P120E

120MHz Pentium® processor, 8MB RAM expandable to 40MB, 11.3" SVGA TFT display

\$2,099

Echos P100E

100MHz Pentium® processor, 8MB RAM expandable to 40MB, 10.4" SVGA TFT display

\$1,799

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100MHz Pentium® processor, 8MB RAM expandable to 40MB, 11.3" SVGA DSTN display

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and the separate Big Business Web Server allows mobile users (such as salespeople) to view Big Business data remotely. And Peachtree's new Business Internet Suite (\$129 list) is an online business in a box, with authoring tools, a secure transaction server, site hosting, e-mail, and Internet access—all integrated with Peachtree Complete Accounting.

The bottom line? Ten years past the days of rigid, complicated, character-based systems, small-business accounting software is easy enough for anyone to understand and use, safe enough to trust with your financial future, and sophisticated enough to give you an accurate picture of your business.

Big Software Inc.

Big Business for Windows 2.0

Although it has some features you won't find in the other products reviewed here, Big Software's Big Business for Windows suffers from shortcomings that are difficult to ignore.

Big Business is targeted at manufacturers and distributors of products, and its current version excels at order processing and inventory management. (It costs \$100 street, and a multiuser upgrade, which supports both Windows and Macintosh clients, is \$2,000 to \$5,000 street.)

Originally developed for the Mac, Big Business 2.0 is the product's first release for Windows, and it shows. Help is only a menu of general topics that are neither context-sensitive nor hyperlinked, performance is slow, and you are limited to a maximum of five open windows. And Big Business does not offer payroll or job-costing functions.

Big Business has an embedded messaging feature that lets you send notes and attachments such as invoices or reports. If you want to put your business online, the product can generate an HTML-based product catalog for you. In fact, Big Software offers a separate Web Server module (\$1,000 street), which allows Internet users to access certain inquiries and reports.

THINKING BIG

Big Business provides 90 sample charts of accounts. Your general ledger accounts can be up to 32 characters long, and Big Business is one of the few small-business ac-

Editors' Choice

- Peachtree Complete Accounting for Windows 4.0
- QuickBooks Pro 5.0 for Windows



Small-business accounting sounds like a low-end product category. But the 11 products we tested for this story were anything but low-end. Most of these affordable

and relatively easy-to-use packages offer—in addition to basic bookkeeping—payroll and job-costing functions, customizable reports, and simple inventory management. Four even support multiple users.

Two products, Peachtree Complete Accounting for Windows 4.0 and Intuit's QuickBooks Pro 5.0 for Windows, earned our Editors' Choice. They are the market leaders in this category for a reason: Each delivers all of the available power features, cloaking them in a well-designed and easy-to-use interface.

Peachtree Complete is the flagship of Peachtree Software's Windows accounting line, which also includes the less expensive, less robust Peachtree Accounting Release 3.5 for Windows and two entry-level products, One-Write Plus 6.0 (acquired last year from NEBS Software) and Peachtree First Accounting 2.0 for Windows. (We also review the latter two in this roundup.)

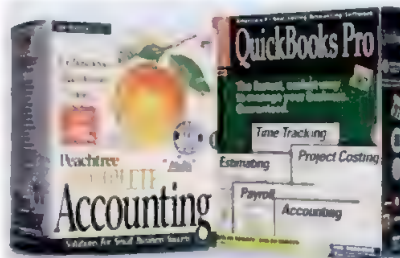
Based on the reliable Btrieve database—usually featured in midrange packages costing thousands of dollars—Peachtree Complete comes with support for multiple users and an unlimited site license. (Only Great Plains Profit 2.10 boasts a similar offer: a Btrieve database and a five-user site license for \$79.) In addition, Peach-

tree Complete's records and forms allow a great degree of detail and customization.

Traditionally regarded as the more difficult to use of the two market leaders, Peachtree Complete has made strides in usability with start-up instructional videos and tutorials. But the leader in this regard remains QuickBooks Pro 5.0 for Windows. Now it is even easier to use, thanks to its new QuickBooks Navigator, a graphical guide to the program's main components.

Like Intuit's Quicken personal financial planning software, QuickBooks Pro is based on an easy-to-use checkbook register metaphor. By contrast, Peachtree uses the traditional debit-and-credit bookkeeping system. With this version, QuickBooks Pro has also added an Accountant's Review, which allows you to send data to the CPA and later merge it with the working files. And QuickBooks Pro's new database engine supports up to 2 billion transactions. (Like Peachtree Software, Intuit offers a less expensive version of QuickBooks that excludes some modules.)

BestWare's M.Y.O.B. Accounting 7.0, deserves honorable mention for its mix of functionality and ease of use. Small-business accounting has become a mature category that offers several excellent choices for the growing business.

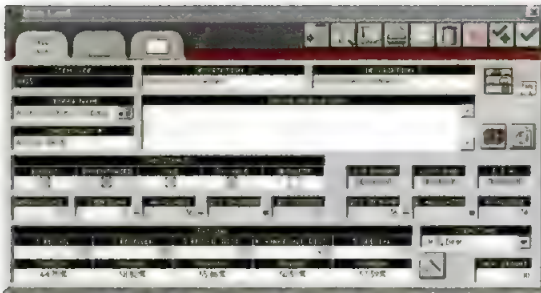


counting packages that effectively supports departments. You can define security by user to restrict access to any window, and you can restrict postings to any prior period. Noticeably absent, though, is a statement of budgeted versus actual income.

You can tailor the features in many ways. For example, you decide whether a credit limit violation will result in a warning. And the program not only lets you categorize customers, vendors, and items by

type but also provides 12 additional user-defined fields for further classification. Big Business provides multiple ship-to and bill-to addresses for customers, and you can put a customer's order and invoice on hold. The program can track royalties (payments you make to writers based on a percentage per sale or a fixed amount per item).

You can create up to five price levels per item and assign customers to the appropriate one, and you can apply an addi-



Big Business for Windows' Item Card window displays key information about your company's products, including quantity and pricing levels.

tional discount when you take an order. Big Business supports both a single-level bill of material and the ability to kit finished goods. It also keeps records of quantities on hand, on order, and committed, and it can track back orders. But oddly, it provides no unit-of-measure conversion.

You can customize forms and reports,

although you can't reformat checks, and report printing is disappointing. You can scroll forward through thumbnail pages but can't shift backward or jump directly to a page, and the program does not display a report's total number of pages.

If Big Software can fill some of the holes, Big Business could become a popular alternative for those seeking strong inventory management and cross-platform support.—*Thomas White*

Big Business for Windows 2.0. Street price: \$100. Requires: 486/66-based PC or better, 16MB RAM, 50MB hard disk space, Microsoft Windows 95 or Windows NT 4.0. Big Software Inc., Cupertino, CA; 800-970-0022, 408-725-7200; fax, 408-725-7205; www.bigsoftware.com. Circle 455 on reader service card.

DacEasy Inc.

DacEasy Accounting & Payroll for Windows 95 3

Like its predecessors, DacEasy Accounting & Payroll for Windows 95, Version 3, is a candidate for companies on the large end of the small-business spectrum. Its inventory features and integration with time-billing software make it appropriate for both product- and time-based businesses.

But DacEasy Accounting (\$149.95 list), which also runs under Microsoft Windows 3.x and Windows NT, doesn't offer sufficient help for new users. It does provide a New Company Wizard, which solicits basic company information and offers 101 widely varied charts of accounts. For more assistance, though, you have to consult a separate Adobe Acrobat document.

Still Using DOS?

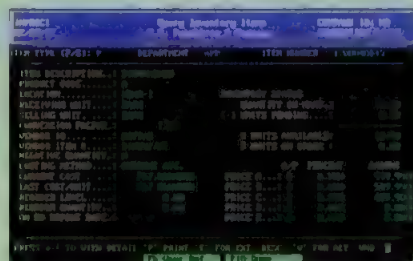
By Will Fastie

Unmoved by our coverage of Windows-based accounting tools? Aha! You must be a die-hard DOS user. Although your numbers are dwindling, a few vendors can help you fend off Windows a bit longer with reasonably up-to-date versions of their DOS-based accounting packages.

Each of these DOS programs is a well-known product and has a Windows sibling in our main story. The Windows connection is important: like it or not, someday you will be absorbed by the Windows juggernaut, and you'll want your DOS data to have a future.

These programs share very similar system requirements. They run on 286 or faster systems, require a minimum of 2MB of RAM, and can run under DOS versions as early as 3.1 (except for Peachtree, which requires DOS 5.0 or later). Hard disk requirements vary. One-Write Plus requires just 10MB of disk space, but multiuser packages will require more disk space and memory. Each product comes on a 3.5-inch disk (5.25-inch disks are also available).

Peachtree Complete Accounting for



The richness of Peachtree Complete Accounting for DOS is evident in its inventory capabilities.

DOS, Version 10, has one of the best reputations among DOS denizens. Peachtree Software (800-228-0068; www.peachtree.com) claims that the DOS version is actually richer in functionality than its younger Windows counterpart. Released in 1996, the package (\$399 list) is loaded. (That's because it's the same program that Peachtree used to sell for \$5,000.) This multiuser edition also runs fine as a single-user program.

Version 7 of **DacEasy Accounting for DOS** also has single-user and multiuser editions (\$249.95 and \$499.95 list, respectively). Although Peachtree throws everything into the same box, DacEasy (800-322-3279; www.daceasy.com)

requires optional modules for payroll, order entry, estimates, and job costing.

One-Write Plus Accounting with Payroll, Version 4.5 (\$50 street), is one of the easier DOS products to use and even includes an audio cassette tutorial, a nice touch. ADP, which owns Peachtree (800-649-1720; www.onewrite.com), now also owns One-Write Plus.

Intuit (800-446-8848; www.intuit.com) still puts out **QuickBooks 2.1 for DOS**, but its days may be numbered. It's not as contemporary as some of the other products here, not as easy to use as One-Write, and not as fully featured as Peachtree Complete. And it is available only in a single-user version (\$60 street). But the Windows version will import the data.

Perhaps the best course is to stick with whatever product you're currently using until you switch to Windows. If you're not using accounting software, buy Peachtree or QuickBooks. Either way, you'll be buying a DOS package that can be upgraded easily to one of our Editors' Choice Windows products.



The new Intel® Pentium® processor-based HP Vectra PCs* for Business have the capability to remotely and simultaneously power-on PCs in switched-off, stand-by or sleeping mode and turn them off again.

HP Vectra PCs include all the hardware and firmware modifications necessary to implement HP NightDIRECTOR, which is supported under HP OpenView Professional Suite management application.

Works over a LAN or WAN, running IP or IPX.

FROM \$992†

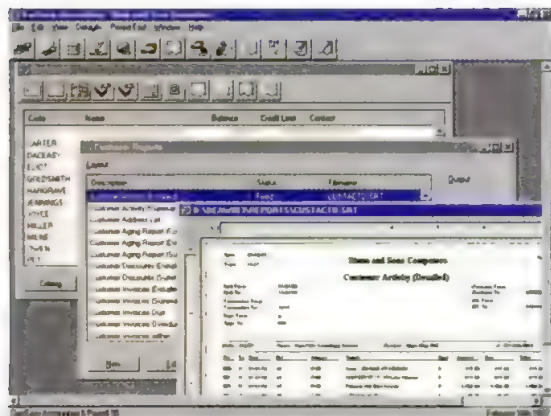
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SOFTWARE

Small-Business Accounting



DacEasy Accounting & Payroll for Windows 95 includes more than 100 standard reports.

CUSTOMER SERVICE

With few omissions, DacEasy Accounting's customer and vendor cards provide a detailed picture of your clients and dealers. A tabbed file folder displays the main contact information (minus e-mail and alternate shipping addresses), defaults (sales rep, terms, and so on), monthly/annual sales or purchases, activity, a phone log, and a memo field. Highlight names in the customer or vendor list and DacEasy Accounting lets you apply finance charges, run relevant reports, and print letters, statements, or labels.

DacEasy Accounting handles other housekeeping tasks competently. Bank-

ing functions are adequate, except for the rather inflexible features for account reconciliation and recurring entries. You can use the Assistant to enter and view to-do reminders for tasks such as follow-up calls. A special module, Fixed Assets, documents details such as cost and depreciation, but the program lacks a module for job costing.

DacEasy Accounting's integration streamlines the flow of products, services, and money into and out of your company.

And invoice templates for products and services, such as the purchase-order forms, offer enough details to get the job done. In addition, you can use the Layout Designer to alter the boilerplate design, selecting from a list of variables.

The program supports product assembly and three inventory methods: FIFO, LIFO, and average costing. For businesses that use time billing, DacEasy Accounting can import data from Timeslips Corp.'s Timeslips Deluxe for Windows.

You handle payrolls using a separate application, which is integrated with the general ledger and is accessible through the main program. You can establish

and track standard and user-defined salary rates and withholding taxes (including federal, state, and local), 401K and cafeteria plans, and vacation and sick leave.

DacEasy Accounting offers over 100 standard module-based reports, as well as a set of financial reports. You can customize many of them, but you can't drill down to see underlying transactions.

Some of these problems may be addressed in Version 4, which should be available by the time you read this. We expect it to include a bevy of new reports, network capabilities, Internet links leading to small-business and accounting information, and maybe even electronic-commerce features. (We'd like to see a cleaner, sharper interface as well.)

All in all, DacEasy Accounting is within reach of its formidable competitors but is not quite there yet.—KY

DacEasy Accounting & Payroll for Windows 95, Version 3. List price: \$149.95. Requires: 386-based PC or better; 8MB RAM (for Windows 3.1), 4MB RAM (for Windows 95), or 12MB RAM (for Windows NT); 20MB hard disk space; Microsoft Windows 3.1, Windows 95, or Windows NT 3.51 or later. DacEasy Inc., Dallas; 800-322-3279, 972-248-0205; fax, 972-713-6331; www.daceasy.com. **Circle 456 on reader service card.**

SUITABILITY TO TASK: ACCOUNTING SOFTWARE

POWER

	Big Business 2.0	DacEasy Accounting & Payroll 3	DacEasy Instant Accounting 2.1	Great Plains Profit 2.10	M.Y.O.B. Accounting 7.0	One-Write Plus 6.0	Pacioli 2000 4.1
General accounting	Good	Fair	Fair	Good	Good	Good	Excellent
Managing cash	Good	Fair	Poor	Good	Good	Good	Excellent
Managing inventory	Good	Fair	Poor	Fair	Good	Fair	Good
Reporting	Fair	Good	Poor	Good	Excellent	Fair	Good

EASE OF USE

	Big Business 2.0	DacEasy Accounting & Payroll 3	DacEasy Instant Accounting 2.1	Great Plains Profit 2.10	M.Y.O.B. Accounting 7.0	One-Write Plus 6.0	Pacioli 2000 4.1
General accounting	Good	Good	Good	Good	Excellent	Good	Poor
Managing cash	Good	Good	Good	Good	Excellent	Excellent	Fair
Managing inventory	Good	Good	Fair	Good	Good	Good	Fair
Reporting	Good	Good	Good	Excellent	Excellent	Good	Fair

General accounting involves company setup, accounting and budgeting, and general ledger postings. We also consider audit-trail and security features and spreadsheet integration.

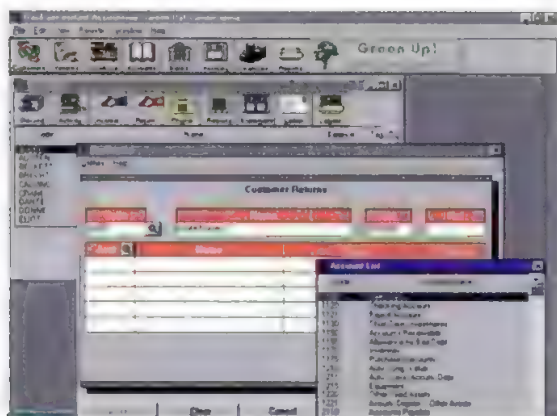
Managing cash concerns those functions associated with the receipt and disbursement of money. We evaluate vendor and customer setup, payment processing,

cash receipts, bank reconciliation, and the ability of a package to help business owners stay on top of cash position.

We consider a series of inventory-related tasks in the **managing inventory** category. These tasks include sales-order processing, quotes and estimates, purchasing, physical inventory counts, and inventory planning.

SOFTWARE

Small-Business Accounting



In DacEasy Instant Accounting's record screens, secondary icons provide easy pathways to related functions.

DacEasy Inc.

DacEasy Instant Accounting 2.1

When it first appeared several years ago, DacEasy Instant Accounting was a capable entry-level accounting program. But since then, this younger sibling to DacEasy Accounting & Payroll 95 hasn't kept up with the competition. It lacks payroll capabilities, offers only basic item tracking and a handful of reports, and provides very limited customizability and integration.

Version 2.1 of DacEasy Instant Accounting (\$49.95 list) limits its imports and

exports to .QIF and DacEasy Instant 1.0 records. And only four modifiable Charts of Accounts are available, for one company per file. Vendor and customer records offer comparable detail, and three user-definable fields can hold tracking and sorting data. You can't create purchase orders or quotes. The invoice form is adequate, but it doesn't let you add any customization except for a bitmapped file of a company logo.

Banking functions are minimal. You can define individual financial accounts and record deposits. You can't schedule checks on a recurring basis, but you can split each one among several categories and print checks individually or as a batch. But the reconciliation function insists that you balance perfectly before you leave and offers little help.

NOT MUCH MUSCLE

DacEasy Instant provides a form for recording items or services that you sell, but it doesn't let you track volume levels or perform any other standard inventory functions like tracking back-order levels and setting alerts. Reporting functions are similarly minimal. You can generate four standard financial reports—Trial

Balance, Budget, Profit and Loss, and Balance Sheet—and make very simple changes to the page arrangement of figures. Beyond this, there are 12 other reports available, such as Audit Trail and Customer Discounts, for which you can specify more parameters than you can for the financial reports.

DacEasy Instant continues to incorporate its Criteria window, which lets you pare down a list of records so you can view only the ones that meet certain conditions. Click on the Criteria icon with the invoice window open,

for example, and you can enter the invoice number, date range, customer code, amount, or printing or posting status. Any invoice that matches the value entered will be listed. You can save criteria and load them again later.

An accounting program whose functions are as limited as those of DacEasy Instant Accounting 2.1 must distinguish itself in another way to be successful. Unfortunately, DacEasy has never quite found such a hook for its junior product, so we can recommend it only for the smallest, simplest service-based businesses. Despite the company's longstanding solid reputation and integrity in this market, DacEasy Instant can't match more usable and feature-complete products that sell for about the same price.—*KY*

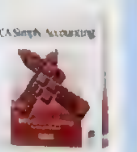
DacEasy Instant Accounting 2.1. List price: \$49.95; payroll module, \$49.95. Requires: 386-based PC or better, 2MB RAM, 3MB hard disk space, Microsoft Windows 3.1 or later. DacEasy Inc., Dallas; 800-322-3279, 214-248-0205; fax, 214-248-0850; www.daceasy.com. *Circle 456 on reader service card.*

Great Plains Software

Great Plains Profit 2.10

Great Plains Profit began its life as a joint venture between Microsoft and Great Plains Software, a well-known maker of accounting software. The package is now in the sole possession of Great Plains, which has taken some aggressive steps to increase its share of the low-end accounting market. Most notably, the price has dropped from its original \$249 to \$79 (list). At press time, pricing was not set for the forthcoming Version 3.0, but it should remain less than \$100 and be available by the time you read this, according to Great Plains.

The user interface in Profit 2.10 is based on a set of file drawers. Clicking on one of the drawers opens it, displaying a new window with a set of folder tabs. Each folder contains a list of the program features applicable to that folder. For example, in the Transactions drawer are folder tabs for Sales, Purchases, and Check Book; the Sales tab lists invoices, sales without invoices, quotes, and refunds. After a bit of use, the interface becomes surprisingly smooth.

Editors' Choice		Editors' Choice	
Peachtree Complete Accounting 4.0	Peachtree First Accounting 2.0	QuickBooks Pro 5.0	Simply Accounting 5.0
			
Excellent	Good	Good	Good
Excellent	Good	Excellent	Good
Good	Fair	Fair	Fair
Excellent	Good	Excellent	Good
Good	Good	Excellent	Fair
Excellent	Good	Excellent	Fair
Good	Good	Excellent	Good
Excellent	Excellent	Excellent	Good

Ratings in the **reporting** category reflect online inquiry, standard and ad hoc reporting, and financial-statement generation. We assess each product's ability to provide meaningful management information as well as key day-to-day reports. Additionally, we look at contact management and information management features, such as to-do lists, phone books, and contact-history features.

www.the-ultimate-display.com

Try it. If you don't agree, we'll give you your money back (but then, of course, you'll have to give back our 21" display).

Moving into the Big Leagues

By Will Fastie

The dream of most small businesses is to grow. So the question small-business owners should be asking themselves is, "Will my accounting software grow too?" Only a couple of years ago, the answer to that question was usually no. In fact, the upgrade path for most products was nonexistent. Today, the small-business accounting landscape is remarkably different as vendors jockey to hang onto their growing small-business customers and attract owners of larger businesses as well.

The first problem a growing small business will likely encounter regards the capacity of its accounting software. Historically, many products have been limited to a maximum of 32,000 entries. That sounds like a lot, but accounting transactions may each consume more than one entry, so even a small business might run into problems. Fortunately, both our Editors' Choices and many other current products now have effectively unlimited capacities for transac-

tions and use state-of-the-art database engines. Capacity isn't an issue anymore.

The second problem concerns the need to have more than one person keeping the books. Technically, this means a product must support multiple users. Remarkably, 4 of the 11 products reviewed here—Big Business for Windows, Great Plains Profit, Pacioli 2000, and Peachtree Complete Accounting for Windows—are network-ready, and M.Y.O.B. Accounting will be by the time you read this. In most cases, these products are multiuser right out of the box, so all you have to do is buy a copy of the software for each user. Peachtree and Profit each come with multiple licenses. Of the top-rated products in this category, only QuickBooks Pro for Windows does not yet support multiple users.

But what if a small business *really* grows? Despite the quality of the products reviewed here and their growing capacity and capability, they are all designed for relatively small businesses. You may find your accountants

demanding a higher level of accounting capabilities to support your growth, in which case you'll have to venture into the midrange category, which includes programs with roots dating back to minicomputers. (Many such programs now live on networks.)

Two of the vendors here, Accpac International and Great Plains Software, also offer midrange products. Both companies plan clean upgrade paths from the entry-level products to their bigger brethren within the next year. **Accpac for Windows** (800-926-8962; www.accpac.com), Btrieve edition, costs \$5,000 and \$10,000. A five-user edition of **Great Plains Dynamics** (800-456-0025; www.gps.com) lists for \$12,500 with an advanced version of Financial Reporting Extender (FRX); with the standard FRX, it's \$10,000. The company offers upgrades for Profit customers.

For now, the new crop of entry-level products will handle your small business better than ever before—and take you further than you may have imagined.

PROFIT POWER

Although Profit compares well with other products in this review, some underlying technology is what sets it apart. First, the data engine in Profit 2.10 is Btrieve 5.1, the most popular engine for midrange accounting software. Btrieve is fast and has a reputation for reliability. Its presence in such a low-cost product is astounding and is excel-

lent news to those concerned about the safety of their financial data. Btrieve also allows very large files (such as an invoice detail record that can handle as many as 80 million files), which should prevent any small business from running out of room.

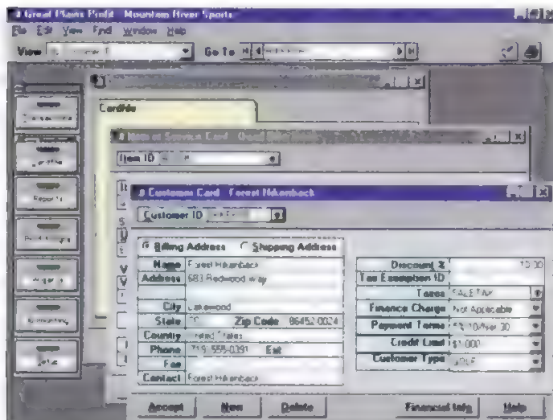
Another benefit of Btrieve is its multiuser design. Great Plains has exploited this by making Profit a five-user system, another astounding development in a \$79 product. And Version 3.0 will incorporate a newer version of Btrieve and come with a Crystal Reports runtime engine.

In view of Profit's impressive capacities, some limits irritated us. For example, ten bank accounts is barely adequate. Although Profit 3.0 will bump this up to 50, small businesses often change banks or restructure accounts. The inactivated accounts must still remain on file as long as there are transactions that reference them. A more annoying

problem is that Profit's general ledger removes the previous year's detail once the year has closed. Given the speed and capacity of contemporary hardware and the presence of Btrieve, it should really be able to refer to several years of general ledger transaction detail. Currently, you can look back only at invoices.

Profit is a very safe choice for the small business that's starting to grow. The ability to have multiple users of the base product is an important factor, but more important is the upgrade path to the manufacturer's high-end accounting product, Great Plains Dynamics. The company promises tools later this year to convert or import Profit 3.0 data directly into Dynamics.—*Will Fastie*

Great Plains Profit 2.10. List price: \$79; payroll module, \$99; suite, \$149. Requires: 386-based PC or better, 4MB RAM, 16MB hard disk space, Microsoft Windows 3.1 or later. Great Plains Software, Fargo, ND; 800-723-3333, 701-281-0550; fax, 701-281-3328; www.gps.com. *Circle 457 on reader service card.*



With its file cabinet and folders, Great Plains Profit's user interface is simple, consistent, and easy to use.

Small-Business Accounting

BestWare Inc.

M.Y.O.B. Accounting 7.0

A veteran player in the small-business category, M.Y.O.B. Accounting—now in Version 7.0—offers a nice blend of ease of use and accounting functionality. It holds your hand from the initial setup to printing financial statements, all the while providing accounting features well suited for service- or product-oriented small businesses. M.Y.O.B. is available for Windows and Macintosh computers, and a multiuser version should be available by the time you read this.

The new setup routine in M.Y.O.B.

for reporting financial statements. You can maintain budgets by detailed account, though you can't import or export your budgets. M.Y.O.B.'s Preferences option lets you choose either to change posted transactions on the fly or to post reverse entries. Other programs, such as QuickBooks and the two Peachtree products, compel you to choose one method or the other.

M.Y.O.B. uses a card file metaphor to maintain customers, vendors, and employees. Each card contains information about a company or person and can be categorized using up to 26 user-defined identifiers. But you can't put vendors on hold and provide separate bill-to and ship-to addresses.

Currently, you can perform these functions only for customers. However, you can customize checks, invoices, 1099s, and all other forms in M.Y.O.B. to fit your specific needs. M.Y.O.B. can update pricing on one or more items based on a mark-up or margin percentage or a gross profit amount that you define. If inventory quantities fall below a mini-

mum stocking level, M.Y.O.B. can automatically create a purchase order or, if you prefer, simply include a restock notification in the To Do List. If an order is entered that exceeds an item's available quantity, M.Y.O.B. will create an invoice for the quantity that can ship right away and a back order for the remaining quantity.

M.Y.O.B. once again shows strength in the small-business accounting market. For a good mix of accounting functionality, ease of use, and flexibility, take a look at M.Y.O.B.—TW

M.Y.O.B. Accounting 7.0. List price: \$84.95; with payroll, \$134.95. Requires: 386-based PC or better, 8MB RAM, 25MB hard disk space, Microsoft Windows 3.1 or later. BestWare Inc., Rockaway, NJ; 800-322-6962, 201-586-2200; fax, 201-586-8885; www.bestware.com. Circle 458 on reader service card.

Peachtree Software, a division of ADP Inc.

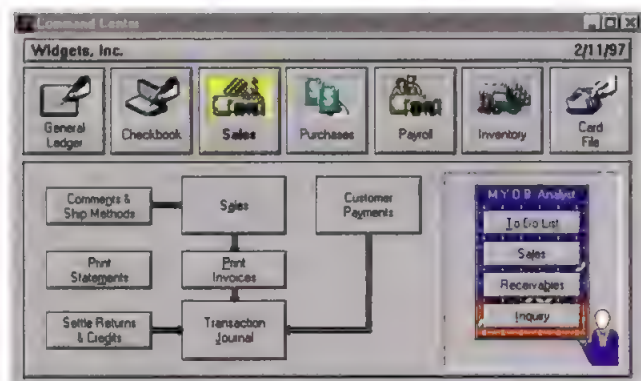
One-Write Plus 6.0

Because of its late entry into the Windows market a few years ago, One-Write Plus lost momentum early on. But its forte remains its usability. Integrated program areas allow record-keeping, transaction-entry, reporting on accounts receivable and payable, payroll management, job-tracking, and inventory handling. But One-Write Plus's lack of detail and flexibility in the latter three areas, in addition to its weak network support and dearth of electronic links, makes it a poor choice for businesses that are product- or employee-heavy or that are eager for online banking and Internet connectivity. It's also poorly suited for growing companies needing solid upgrade paths.

One-Write Plus (\$69.95 list) doesn't let you import data from any program other than an earlier version of the program itself. Vendor and customer screens and subscreens provide a respectable number of boilerplate fields, but no user-definable ones. One-Write Plus also lacks any links to information management functions.

BASIC BANKING

One-Write Plus aptly handles miscellaneous banking functions, such as service charges, transfers, and account reconciliations in register windows. You can document in separate entry screens customer and vendor transactions such as cash receipts and credit memos, finance charges, and purchases and payments. And you can slightly modify—include or exclude return



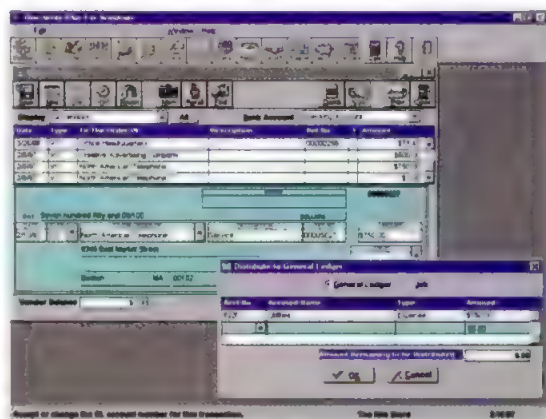
M.Y.O.B. Accounting's desktop displays the flow for the current function, such as sales, allowing you to jump easily to a desired task.

(\$84.95 street) walks you through company creation and provides more than 100 sample charts of accounts covering nearly any industry imaginable. A multimedia presentation demonstrates M.Y.O.B. basics and can even tutor the accounting-challenged on concepts such as T-accounts and double-entry bookkeeping.

FOLLOW THE SIGNS

For each function, M.Y.O.B.'s intuitive interface displays a flow map that visually indicates available tasks and the order in which you should perform them. Its workflow is based on a dynamic To Do List that helps the user stay on top of key business events, such as invoices to be paid, purchases required to replenish inventory, and overdue customer invoices. You can drill down for more information on an item throughout the program, so you never wonder what transactions make up a specific balance.

M.Y.O.B. lets you define a four-digit account number and different levels of depth



One-Write Plus uses its auxiliary screens effectively to make its various tools more easily accessible.



WHEN THE ARMED FORCES REALIZED THAT OUR
TURBOCHIP COULD MORE THAN DOUBLE THE SPEED
OF THEIR 486S, THEY DECIDED TO PICK SOME UP.

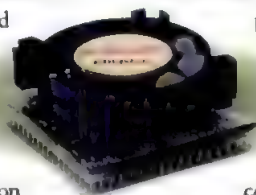


The military has to be able to act quickly, and so do their computers. Maybe that's why they decided to upgrade their 486s with Kingston® TurboChips—an approved component on the GSA purchasing schedule. The TurboChip™ can extend the life of your fleet, too, whether you have 486-based DX2, DX, SX2, or SX systems. In the words of



Unleashes
the power of
Windows NT® 4.0

an Army computer scientist at the Army's Pentagon Automation Technology Branch, "The Kingston chip was completely compatible with all our systems and had an amazing



performance improvement.*" The TurboChip's 5x86 clock-quadrupled technology helps your system run up to three times faster with all the power you need to run today's demanding software. Designed with AMD's Am 5x86-P75 CPU, it upgrades most IBM-compatible desktop systems. And since the TurboChip is a chip-for-chip replacement upgrade, it's easy to install. Plus, it preserves your system configuration. Call today to find out why the military says,

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*10/31/96 evaluation by Ron Jarmuth, Chief Automation Technology Branch, HQDA-IMCEN, Pentagon Automation Technology Branch. Kingston Technology Company, 17600 Newhope Street, Fountain Valley, CA 92708 USA, (714) 435-2600, Fax (714) 435-2699 © 1996 Kingston Technology Company. All rights reserved. Kingston is a registered trademark and Computing Without Limits and TurboChip are trademarks of Kingston Technology Company. Windows NT is a registered trademark of Microsoft Corporation.

SUMMARY OF FEATURES

Small-Business Accounting



	Big Business for Windows 2.0	DacEasy Accounting & Payroll for Windows 95 3	DacEasy Instant Accounting 2.1	Great Plains Profit 2.10	M.Y.O.B. Accounting 7.0	One-Write Plus 6.0	Pacioli 2000 4.1	Peachtree Complete Accounting for Windows 4.0
■ YES ■ NO								
Products listed in alphabetical order								
Price	\$100 (street)	\$149.95 (list)	\$49.95 (list)	\$79.00 (list)	\$84.95 (list)	\$69.95 (list)	\$49.95 (list)	\$200 (street)
Payroll module	N/A	Included	\$49.95 (list)	\$99.00 (list)	\$134.95 (list)	Included	Included	Included
General Features								
Multuser version	\$1,000-\$2,000	None	None	Included	\$449.00	None	Included	Included
Online/printed tutorial	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Sample charts of accounts	90	101	4	21	100	13	23	75
Sample data provided	■	■	■	■	■	■	■	■
Data-entry automation	■	■	■	■	■	■	■	■
Drill-down analysis from summary GL to originating transaction	■	■	■	■	■	■	■	■
Report writer	■	■	■	■	■	■	■	■
Direct export to Microsoft Excel/Word	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Customizable invoices/statements	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Customizable checks/purchase orders	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
General Ledger								
Characters in account number	32	10	10	5	4	6	16	15
Allows entry of next year's budget	■	■	■	■	■	■	■	■
Future-period processing	■	■	■	■	■	■	■	■
Maximum periods maintained online	Unlimited	13	12	24	26	Unlimited	36	26
Maximum transactions maintained online	Unlimited	Unlimited	32,000	80 million	32,000	Unlimited	Unlimited	Unlimited
Summary/detail trial balance	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Financial statement of cash flow	■	■	■	■	■	■	■	■
Purchasing/Accounts Payable								
Checks history for duplicate invoice number	■	■	■	■	■	■	■	■
Permits recurring vouchers	■	■	■	■	■	■	■	■
Receives partial shipments against PO	■	■	N/A	■	■	N/A	■	■
Suggests POs based on Min/Max	■	■	N/A	■	■	N/A	■	■
Online banking/electronic payments	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Can void checks	■	■	■	■	■	■	■	■
Allows payment selection by vendor ID/name	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Allows payment selection by due date	■	■	■	■	■	■	■	■
Permits check reprinting	■	■	■	■	■	■	■	■
Prints cash projection by due date	■	■	■	■	■	■	■	■
Prints check register	■	■	■	■	■	■	■	■
Prints 1099 report/forms	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Invoicing/Accounts Receivable								
Can track sales quotes	■	■	■	■	■	■	■	■
Ship-to/bill-to locations per customer	Both unlimited	1, 1	1, 1	1, 1	1, 1	1, 1	1, 1	9, 1
Checks credit limit by amount	■	■	■	■	■	■	■	■
Checks credit limit by days outstanding	■	■	■	■	■	■	■	■
Invoice field for freight/miscellaneous charges	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Calculates finance charges	■	■	■	■	■	■	■	■
Handles recurring billings	■	■	■	■	■	■	■	■
Applies cash receipts to multiple invoices	■	■	■	■	■	■	■	■
Prints sales tax reports	■	■	■	■	■	■	■	■
Prints aging report in summary/detail	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Prints sales by salesperson/items	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Inventory								
Characters in inventory-item code	18	16	14	15	13	10	16	20
Tracks quantity on hand/on order/committed	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Back-order processing	■	■	■	■	■	■	■	■
Inventory costing methods	Average cost	Average cost, FIFO, LIFO	None	Average cost, last cost	Average cost	Average cost	Average or stan- dard cost, FIFO, last purchase price, LIFO	Average cost, FIFO, LIFO
Number of price levels by item	5	10	1	1	1	3	6	5

N/A—Not applicable: The product does not have this feature

Small-Business Accounting

PC MAGAZINE
EDITORS' CHOICEPeachtree First
Accounting 2.0
for Windows\$50 (street)
Included

None

75

15

26

Unlimited

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QuickBooks
Pro 5.0 for
Windows\$200 (street)
Included

None

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Unlimited

2 billion

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Simply
Accounting for
Windows 5.0\$120 (street)
Included

None

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Unlimited

65,000 per year

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addresses and certain account numbers or IDs, for example—forms that are regularly processed, such as invoices and checks. This level of detail should suffice for small or slightly larger businesses, but we would welcome more customizability.

Payroll screens and transaction options are thorough enough that you can track deductions and salary options, as well as comply with government regulations. On the main employee data-entry screen, you'll find icons containing the most fundamental data (such as contact info, pay rates, and accrued vacation/sick time), which open windows for documenting required figures including withholdings, employer contributions, common deductions, earnings (in up to six pay cycles), and W-2 data.

You can do simple job-tracking in One-Write Plus, defining each project by basic parameters such as projected duration, income and expenses, and related activities. Related transaction forms, such as checks and invoices, each include an optional Job ID field for tracking and reporting, and inventory-tracking is similarly fundamental.

One-Write Plus also provides enough filters for its many standard reports. You can't, however, drill down on reports, see graphs, or run custom reports. But you can report a generous number of formats and print or send them through a MAPI-compliant e-mail system.

We'd ultimately like to see One-Write Plus catch up with today's best programs. As it stands, we can recommend the product as a worthy upgrade to longtime users, or as a starter product for very small businesses with simple or nonexistent inventory management needs.—KY

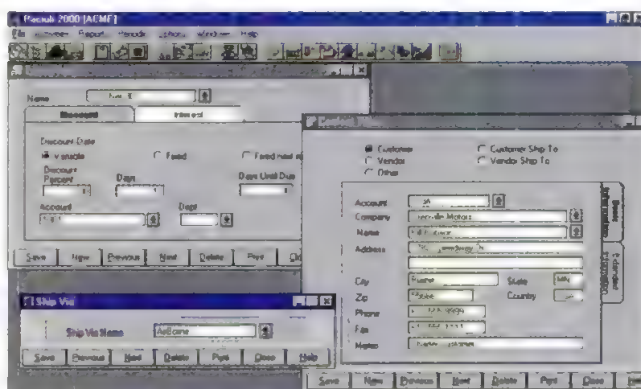
One-Write Plus 6.0. List price: \$69.95. Requires: 486-based PC or better, 8MB RAM, 25MB hard disk space, Microsoft Windows 3.1 or later. Peachtree Software, a division of ADP Inc., Norcross, GA; 800-228-0068, 770-724-4000; fax, 770-564-5888; www.peachtree.com. *Circle 459 on reader service card.*

M-USA Business Systems Inc.

Pacioli 2000 4.1

As a DOS product, Pacioli 2000 always offered impressive functionality at a bargain-basement price. M-USA's first Windows version of its product continues that tradition. Pacioli 2000, Version 4.1, offers the same core modules found in its competitors, as well as some extras such as Point Of Sale. Pacioli 2000 comes in a package entitled Pacioli 2000 Business Team (\$49.95 list), which also includes a payroll module.

But Pacioli 2000's Achilles' heel remains its inaccessibility to novice book-



Pacioli 2000's Contact Table stores the basics on customers plus a few details, such as last-purchase date and salesperson.

keepers. The program uses unfamiliar terms, and its interface pales when compared with the interfaces found in programs such as QuickBooks Pro 5.0 for Windows and M.Y.O.B. Accounting.

M-USA says you can import data into Pacioli in .TXT format, but we were unsuccessful with this process. Pacioli lets you enter customer and vendor records via its Contact Table or the Accounts Maintenance window. The latter allows for more detail in things such as terms and credit limits, but neither allows custom fields. Other setup and maintenance items in the File menu let you lock, close, and purge periods (36 may remain open simultaneously), as well as define tables for such items as departments, terms, salespeople, discounts, and projects.

Forms for sales and purchase transactions are quite detailed, and integration with and updating of affected modules are good. Though you can modify the forms' output only if you're using Crys-

tal Reports (a report generator from Seagate Software), Pacioli gives you a good variety of forms, including quotes and invoices, purchase orders, receipts, and return and layaway forms. Checks, as well as sales transactions and purchase orders, can be memorized and recalled in user-defined cycles.

TAKING STOCK

Pacioli allows for five inventory costing systems (an impressive number): LIFO, FIFO, average cost, standard cost, and last purchase price, and it lets you change your method when necessary. Inventory-item screens store adequate detail, including up to six discount levels per item, and processing systems are quite flexible. You can, for example, choose to let an item inventory go negative, while receiving alerts regarding low stock and recommended reorder quantities. You can print count sheets, establish random product counts, and freeze inventory for counts.

Other elements of Pacioli follow this same pattern, providing competent record-keeping and transaction-processing, with more advanced capabilities in some cases. You can define costs and dates and materials needed for projects, and you can keep updated on their progress.

One weak spot in Pacioli is reporting. It provides few financial and management reports, but the ones offered have good filtering and sorting options. Furthermore, during testing, we experienced repeated system crashes while attempting to run reports.

Better integration of Pacioli 2000's often-impressive functions, a clearer and simpler interface, and enhanced customizability and stability would help this product achieve its potential. As it is, we hesitate to recommend it to anyone but an experienced financial professional for whom interface niceties are not an issue.—KY

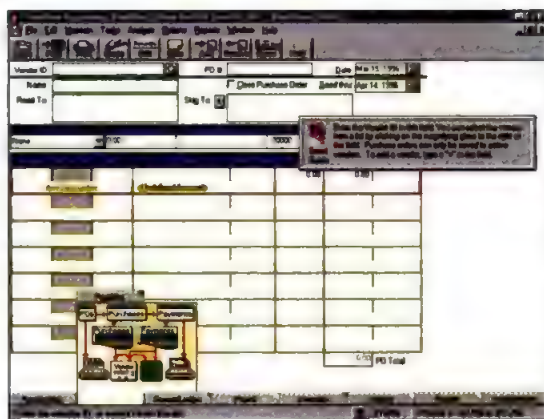
Pacioli 2000, Version 4.1. List price: \$49.95. Requires: 386-based PC or better, 4MB RAM, 12MB hard disk space, Microsoft Windows 3.1 or later or Windows NT 3.51 or later. M-USA Business Systems Inc., Carrollton, TX; 800-933-6872, 214-407-6994; fax, 214-407-6945. *Circle 460 on reader service card.*

Peachtree Software, a division of ADP Inc.

Peachtree Complete Accounting for Windows 4.0



A pumped-up version of Peachtree Accounting Release 3.5 for Windows, Peachtree Complete Accounting for Windows, Version 4.0 (\$200 street), offers more detailed project tracking, fixed assets, back-order processing, and drop-shipment processing. All this comes on top of an already capable, network-ready accounting system whose flexible, thorough transaction processing and reporting systems are sophisticated enough for



Peachtree Complete's Purchase Order entry screen offers as much guidance as its other data-entry screens.

both small businesses and those with more than 50 employees and millions of dollars in sales.

Users will either love or loathe the interactive, multimedia startup sessions in Peachtree Complete. Tutorials are also available for newbies, as are on-screen guides. Peachtree Complete's functional flexibility, such as its ability to keep 26 periods open, also contributes to its easy operation. QuickBooks Pro for Windows retains an edge in terms of ease of use, but Peachtree Complete holds its own as a suitable program for novice bookkeepers.

KEEPING TABS

Peachtree Complete stores customer and vendor records, as well as employee and sales-rep files, in tabbed file folders. These hold general information (including up to nine ship-to addresses), default information such as the sales rep and pricing level, five custom fields, and a history

screen. Employee records are detailed enough to run a complex payroll.

The data from customer and vendor records flows into the forms for recording purchases and sales. Customizable forms are supplied for quotes and invoices, sales and purchase orders, and payroll and other checks. The level of detail in these documents and the financial machinations they make possible are exceptional. For example, you can receive partial shipments against a purchase order and ship partial quantities against a sales order. You can process drop shipments and accept inventory before the bill arrives.

Peachtree Complete supports three inventory methods (LIFO, FIFO, and weighted average). You can assign as many as five pricing levels per item and earmark inventory for assemblies. Peachtree Complete lets you assign cost codes to jobs, clone job details, and break down a project into phases. And a Fixed Assets module documents—among other things—cost, depreciation, and book value of your assets.

Peachtree Complete excels in management reporting. Its "alert signals" monitor your financials, displaying messages when specific conditions arise (like a low inventory level or an over-budget account). Graphical tools report on cash flow and on money owed and due. Standard reporting tools generate a healthy collection of modifiable reports that give you easy access to underlying transactions.

It's a bold move to call your product "complete," but Peachtree Software can boast this more confidently than most of the other products here. Thanks to hands-on learning and operational tools for novices and high-end accounting tools for bigger businesses, we can recommend Peachtree Complete for service- and product-based businesses at both ends of the small-business spectrum.—KY

Peachtree Complete Accounting for Windows, Version 4.0. Street price: \$200. Requires: 386-based PC or better, 8MB RAM, 24MB to 38MB hard disk space, Microsoft Windows 3.1 or later. Peachtree Software, a division of ADP Inc., Norcross, GA; 800-228-0068, 770-724-4000; fax, 770-564-5888; www.peachtree.com. *Circle 461 on reader service card.*

Premier Power Platform

PREMIO® HX - P200



Premier Premio HX stands for dependability. Made by CompuTrend, an Inc. 500 company, all Premio motherboards and monitors are ISO-9000 certified. And YES, all Premio computers are NetWare® certified in our Novell® Labs approved test center. Premio computers carry a 3-year warranty, with optional on-site service.

Power A versatile, high performance platform, the Premio HX is your best choice for Windows 95 and mixed 16- and 32-bit environments. With Concurrent PCI, Bus Master IDE, ECC, and USB support, Premio delivers the power and reliability needed for your business applications.

Platforms The Premio HX is tested compatible with NetWare 4.x, Windows NT, Solaris®, and SCO® Unix, and is DMI-enabled. We cross test and integrate components from Adaptec®, 3Com®, ATI®, and others. Custom, local assembly ensures solutions tailored to your needs are delivered quickly.

"In short, this (PREMIO HX) system will do just about anything you might need, and for a very reasonable price."

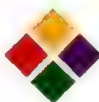
--- Windows Magazine, November 1996

For more information on how Premio Power Platforms can help your business, please contact us immediately:

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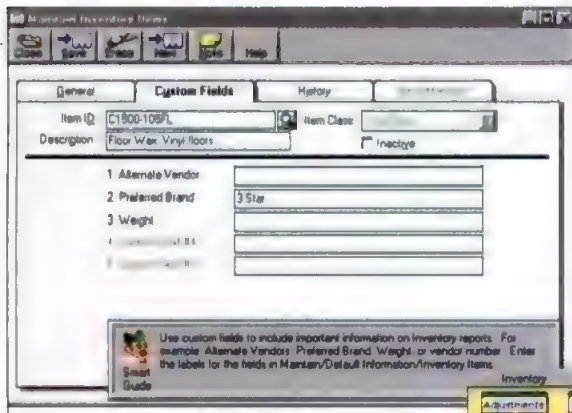


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Peachtree Software, a division of ADP Inc. Peachtree First Accounting 2.0 for Windows

Designed for start-ups and small businesses with modest accounting needs, Peachtree First Accounting 2.0 for Windows targets users who don't have the time or expertise to tackle complex terminology or operations but need integration with GL, AP, and AR; simple inventory-and job-tracking; and payroll functions.



Peachtree First Accounting's pop-up navigation guide walks you through the program's functions.

First Accounting (\$50 street) looks and works like Peachtree's senior products, but it lacks those products' job-costing features, fixed-assets management, back-order and sales-order processing, and management-level features. These drawbacks prevent First Accounting from landing a top spot among low-end accounting packages, but it's nevertheless a well-positioned, well-designed program with a reasonable price tag and a clear upgrade path.

Setup is broken out step by step in an interactive tutorial, which lets you choose between cash and accrual accounting and batch or real-time posting. You can also select from 75 sample Charts of Accounts. The tutorial also describes and lets you specify defaults for such variables as payment terms and finance charges, user-defined fields on record-maintenance screens, and sales-tax authorities and codes.

ACCOUNTING ASSISTANT

First Accounting's pop-up navigation guide runs across the bottom of the screen, divided into main functional areas and their related tasks. Click on one and the appropriate processing screen opens.

Customer, vendor, and employee screens allow for ample detail, as do related forms such as invoices, purchase orders, and receipts. First Accounting lets you keep 26 periods open at once, simplifying past and future transaction-processing while enforcing rules that maintain the audit trail.

If your inventory needs require back-order processing, management of drop shipments, and multiwarehouse tracking, look elsewhere. But First Accounting, like most products in this category, offers just enough horsepower to maintain simple inventories.

Payroll capabilities are a bit more elaborate. Besides tracking basic deductions and salary information, First Accounting lets you modify tax tables yourself (or subscribe to Peachtree's Tax Service program). You can build very basic records that describe each project and its income and expenses, as well as assign revenues to jobs in related records such as sales and journal entries.

First Accounting lacks management-level reports and a report writer, but the number and customizability of reports available is more than adequate. You can alter the layout of dozens of standard financial and module-specific reports, and drill down to see underlying transactions. You can export information in ASCII.

It's hard to beat this much functionality and usability offered at such a reasonable price. We recommend First Accounting for both first-time and seasoned accounting software users who don't need high-level reporting or detailed, integrated features in such areas as inventory and job costing.—*KY*

Peachtree First Accounting 2.0 for Windows. Street price: \$50. Requires: 386-based PC or better, 4MB RAM, 18MB hard disk space, Microsoft Windows 3.1 or later. Peachtree Software, a division of ADP Inc., Norcross, GA; 800-228-0068, 770-724-4000; fax, 770-564-5888; www.peachtree.com. Circle 461 on reader service card.

Intuit Inc.

QuickBooks Pro 5.0 for Windows



One measure of how popular Intuit's QuickBooks has become is that accountants are finally giving in to their clients and providing support for the program. QuickBooks earned its following by focusing on ease of use, and the \$200 (street) QuickBooks Pro 5.0 for Windows is no exception. If your business does not need time-billing, estimating, or job costing, note that a standard version, QuickBooks 5.0 for Windows, is available for \$99.95 (list).

QuickBooks is popular for other reasons as well. Many small businesses have kept books with Quicken, Intuit's market-leading personal-finance program, which, though masterful at checkbooks, doesn't address business accounting needs. Fortunately, Intuit has provided an easy migration path from Quicken to QuickBooks. Like its little brother, QuickBooks is checkbook-centric and very easy to use, requiring almost no accounting knowledge. If your business focuses on nothing but deposits and checks, QuickBooks will still provide your accountant with a decent set of books and the business with a comprehensive set of reports.

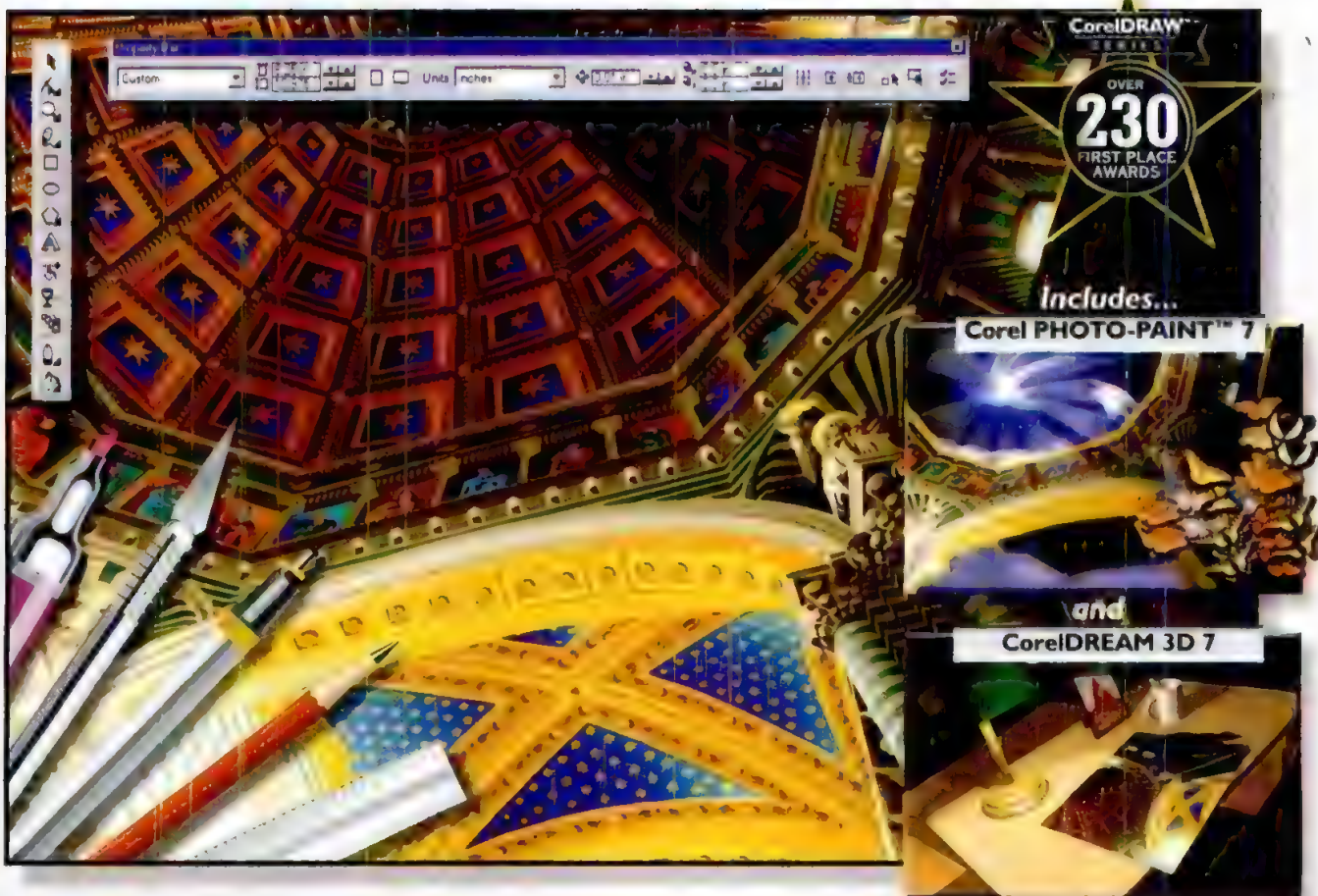
ACCOUNTING ROAD MAP

One of the best new features of QuickBooks Pro 5.0 is an optional user interface called the QuickBooks Navigator, which makes the program easy to use and very intuitive. Basically a window with a graphical representation of the major compo-



QuickBooks Navigator is a new, easy-to-use graphical interface. Arrows show the workflow and cash flow.

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Small-Business Accounting

nents of the books (such as Sales and Customers), QuickBook Navigator is much faster to use than the menus and much richer than the old QuickBooks toolbar. Each of the components has its own tabbed panel with the applicable features shown in a flow diagram. BestWare's M.Y.O.B., also reviewed here, originally introduced these diagrams, but QuickBooks Pro has taken them a step further so that they can help the bookkeeper see the relationship between the program's functions and the money. (M.Y.O.B. showed the connection between the various accounting components.)

Previously, when your accountant performed modifications, you either had to refrain from working with QuickBooks Pro while the data was in your accountant's hands, or you had to adjust entries in the GL journal every time your accountant made a change. But now, with its powerful Accountant's Review facility, QuickBooks Pro makes a copy of the data file for your business to send to your accountant, who then makes modifications directly to the file. While the data is

gone, you can continue to use QuickBooks Pro as if nothing had happened. When your accountant is done, QuickBooks Pro exports the changes and merges with the working file. This simple process preserves the business's smooth workflow.

In prior versions of QuickBooks, Intuit's proprietary database engine limited the number of transactions to about 32,000—an amount that prevented some businesses from keeping two years of data on hand for year-to-year comparisons. But QuickBooks Pro's new engine now supports as many as 2 billion transactions.

QuickBooks has steadily improved since its debut in 1992. This version is a terrific upgrade that current QuickBooks owners should hasten to acquire and that new users will find a joy to use.—WF

QuickBooks Pro 5.0 for Windows. Street price: \$200. Requires: 486-based PC or better, 8MB RAM, 42MB hard disk space, Microsoft Windows 3.1 or later. Intuit Inc., Palo Alto, CA; 800-446-8848, 415-944-6000; fax, 415-944-2955; www.intuit.com. Circle 462 on reader service card.

Accpac International, a division of Computer Associates Inc.

Simply Accounting for Windows 5.0

Computer Associates is finally getting its act together in the low-end market, thanks in part to a reorganization. Desktop software, including accounting packages, is now the sole responsibility of Accpac International, Computer Associates' West Coast division, so Simply Accounting is no longer an orphan.

From an accounting perspective, Simply Accounting for Windows, Version 5.0, provides most of the features and functionality that most small businesses need. But what Simply Accounting supplies in terms of its feature set, it markedly lacks in presentation. Simply put, the user interface needs some work.

The main window comprises six columns labeled General, Payables, Receivables, Payroll, Inventory, and Project. In each column are icons for functional areas. For example, Vendors, Purchases, and Payments are listed under Payables.

A deciduous plant native to the north temperate zone. Foliage may cause cooling of the Earth's surface by blocking energy radiated from the sun.

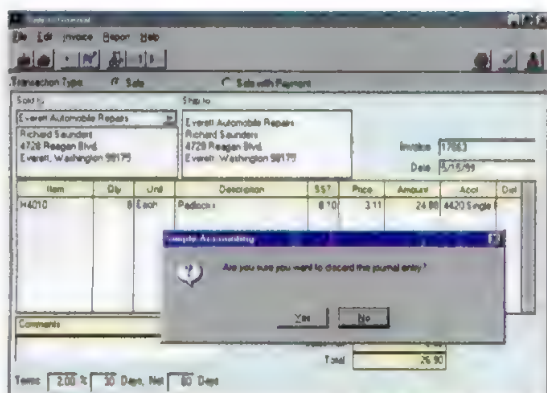
A mammal of the genus *Equus*. Equipped with outgrowths of scleroprotein which elicit a pleasant sensation when manipulated.

The HP Network ScanJet 5. Converts paper-based information into electronic data for transmission across LANS and WANS to a client PC, fax server, or network printer. Connects through Windows NT, Novell Netware 3x and 4x. Scans at 300 dpi with a 15ppm automatic document feeder and flatbed capability. For more information, log on at www.hp.com/go/network_scanning.

Built by engineers.

SOFTWARE

Small-Business Accounting



Jargon such as the term *sales journal* instead of *invoice* makes Simply Accounting for Windows less approachable.

The terminology, however, is very accounting-oriented at a time when most competing programs try to avoid accounting jargon in favor of more easily understood words and phrases referring to real-life objects (invoices, for example, are called "sales journals"). And this accounting jargon sometimes pervades the product to such an extent that you may have trouble finding a desired function.

Terminology aside, Simply Account-

ing does have its strong points. Most notable is the inclusion of a special version of CA-RET, Computer Associates' report writer (the special version works only with Simply Accounting 3.0 or later). The company built all the reports in Simply Accounting with CA-RET, so you can customize any of the standard reports as needed. You can also create new reports, although running them involves using CA-RET directly; you can't launch custom reports from within Simply Accounting. With CA-RET, however, it's possible to specify very complex queries to the accounting database, so virtually any kind of report is possible.

Simply Accounting limits general ledger account numbers to four digits, and the accounts are predefined in five groups of 1,000 numbers each. For example, account numbers 1,000 to 1,999 are asset accounts by definition. Simply Accounting limits its GL accounts to 5,000, though

most businesses don't need that many anyway. But the relatively small number of account numbers means that you must take care when adding new GL accounts. Unlike some of the other packages reviewed in this roundup (such as Great Plains Profit 2.10, which allows ten accounts), Simply Accounting doesn't offer a practical limit on the number of bank accounts; as long as there is an available asset account number, you can add a new bank account.

Simply Accounting is probably most appealing to CPAs, because of its strong accounting orientation. Others may find it awkward and outdated compared with most of the other products reviewed here. But as long as the user interface doesn't get in the way, Simply Accounting can do the job.—WF□

Simply Accounting for Windows 5.0. Street price: \$120. Requires: 486-based PC or faster, 8MB RAM, 12MB hard disk space, Microsoft Windows 3.1 or later. Accpac International, a division of Computer Associates, Santa Clara, CA; 800-773-5445, 408-562-8800; fax, 408-562-8466; www.accpac.com. Circle 463 on reader service card.

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EIZO NANAO WINS AGAIN!

Back To Back Nod For Monitor Maker

By Rex G. Looshun
MONITOR STAFF WRITER

LOS ANGELES — It's an announcement that is becoming all too familiar. EIZO Nanao Technologies has once again taken home the coveted Editor's Choice Award from PC Magazine.

This sixth award in the past six years goes to the company's FlexScan® TX-C7S 17-inch class color monitor. It's an honor that carries particular significance as it cites superiority in the judging category having the toughest standards.

"The TX-C7S monitor's image was especially sharp and clear, with no detachable faults," said a PC Magazine judge.

Not too surprising for EIZO, though. The company's monitors previously earned Editor's Choice



**October 8, 1996
FlexScan TX-C7S**

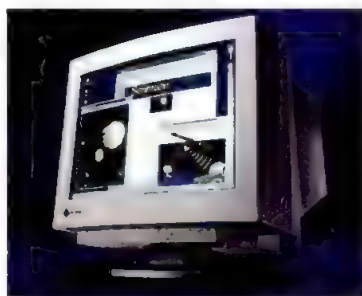
accolades in 1990, 1992, 1993— for its FlexScan 9400, F550iW and FlexScan F340iW monitors— and last year for its highly regarded FlexScan T2-17TS model.

TX-C7S Lauded as 'Best of the Best'

By E.Z. Viewin
MONITOR STAFF WRITER

LOS ANGELES—Words such as "unbeatable," and "top flight," have been flying around town ever since EIZO Nanao's FlexScan TX-C7S 17-inch class color monitor walked off with the 1996 PC Magazine Editor's Choice Award.

With this key award under its belt, the FlexScan TX-C7S figures to be the monitor of choice for graphics and business professionals who demand crisp, true-to-life colors and stable screen images



This year's big winner: The FlexScan TX-C7S 17-inch class color monitor.

for desktop publishing, 24-bit imagery, high-end graphics and multimedia applications.

Editor's Choice: The Award That Shapes Industry Thinking



It's deja vu all over again: EIZO Nanao has now won six Editor's Choice Awards in six years.

By Mona Turri
MONITOR STAFF WRITER

LOS ANGELES—Winning a PC Magazine Editor's Choice Award tells the world of hungry hardware buyers that you've arrived in a big way.

"It's the one award we all dream about, the one we covet more than any other," said N.V.S. Guy of Silicon Valley's LuzerCom.

EIZO Nanao monitors have earned worldwide recognition for dependability, cost-effective performance and pleasing, ergonomic design. In fact, I'm going to stop writing this story right now so I can call EIZO Nanao Technologies at 1-800-800-5202. Then again, I could get an informational fax on demand by calling 1-800-416-FLEX. Either way, like the TX-C7S, I'm a winner.



EIZO is Nanao's New Universal Brand Name
EIZO Nanao Technologies Inc., 5710 Warland Dr., Cypress, CA
90630 Web Site: <http://www.eizo.co.jp/welcome>

PC Tech

THE DEFINITIVE GUIDE TO PC TECHNOLOGIES & TOOLS

Information Retrieval for Your Intranet

Tools to make corporate data more accessible.

By Scot Finnie



If the knowledge base that is the essence of any company were a single stack of text files overflowing on some set of archival drives in a dark, cool, dry room, building a tool to get at it would be easy. But people are the originators of corporate data, and they have a pesky tendency to record ideas, tote up numbers, and analyze information using all sorts of different tools. When it comes to accessing that data, different file formats definitely aren't better.

For some companies, file types aren't the problem; the sheer volume of data facing intranet implementers and their would-be benefactors is the hurdle to overcome. We the people of the corporate world are drowning in our own prolific brilliance, calculation, and insight. Yet there's little point in creating yet another information

IN THIS SECTION



OPERATING SYSTEMS You can connect to most Internet service providers easily using Windows 95's Dial-Up Networking feature. But there are some ISPs that require more than just a user ID and password. For services like these, such as SLIP accounts, you can automate log-on using the Dial-Up Scripting tool, and in this column we'll show you how to do exactly that. *Page 231.*



POWER PROGRAMMING Three insiders' techniques from Jeff Prosize give your MFC C++ programs a more professional appearance. Learn how to prevent your application from performing unnecessary screen redraws, to get print previews to reflect whether the printer is a color or monochrome device, and to predict where page breaks fall when you're about to print a document. *Page 237.*



UTILITIES ZDKeyMap is a Windows 95 extension that lets you change the meaning of any of the standard keys on your keyboard. It adds a Key Mapping page to the Control Panel's Keyboard Properties applet, in which you can assign any character to any key. This is handy for changing keys that you hit by accident or switching to a more-efficient Dvorak keyboard layout. *Page 251.*

ALSO IN THIS ISSUE In PC Solutions we show you how to expand your Windows Taskbar so you can view the entire text associated with each button, tell you how to enable or disable Advanced Power Management, give you some tips on how to make Word format dates and number pages the way you want, provide a solution that will help you deal with rounding errors in your spreadsheet programs, and much more. *Page 279.*

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Intranet Search Tools: *A variety of options exist for implementing a search system on your intranet. Here's a summary of salient features, costs, and requirements of the top products.*

☐ YES ☐ NO	AltaVista Search Intranet PX	Excalibur RetrievalWare	Excite for Web Servers (EWS)	Fulcrum Surfboard	Microsoft Index Server	Netscape Catalog Server
Platforms	Digital Unix for Alpha, Solaris 2.4, Windows NT 4.0 (Intel or DEC Alpha)	AIX 4.1, Digital Unix, HPUX 9.0 or later, Solaris 2.3 or later, Windows NT 3.51 or later (Intel or DEC Alpha)	AIX 4.1, BSDI 2.0, Digital Unix for Alpha, HPUX 10.0 or later, Irix 6.0, Linux, Windows NT 4.0 (Intel or DEC Alpha), Solaris 2.4, Solaris x86, SunOS	HPUX 9.0 or later, Siemens RM-Sinix, Solaris 2.3 or later, Windows NT Server 3.51 or later (Intel or DEC Alpha)	Windows NT Server 4.0 (Intel or DEC Alpha)	AIX 3.2 or later, Digital Unix, HPUX 10.0, Irix 5.3 or later, Solaris 2.4, Windows NT Server 3.51 (Intel or DEC Alpha)
Document types	HTML, MS Exchange and Eudora (through AltaVista Search My Computer PX), MS Office, PDF, SQL (ODBC, through AltaVista Search Developer's Kit 97), text, others	HTML, Lotus Notes, MS Office, Newswires, PDF, SQL (ODBC), text, Web protocols, others	HTML, text	HTML, MS Office, NetNews, PDF, SQL (ODBC), text, Web protocols, others	HTML, MS Office, text	HTML, MS Office 95, PDF, SQL (ODBC), text, Web protocols
Indexes multiple servers	☒	☒ (with optional Web-Synchro spider module)	☒	☒	☒	☒
Foreign Languages	French, German, Spanish	French, Spanish	None	Dutch, French, German, Italian, Spanish, Swedish	Dutch, French, German, Italian, Spanish, Swedish	None
SEARCH						
Query types	Boolean, date range, free text, phrase, sentence, wildcard	Boolean, date range, numeric range, phrase, query by example, sentence, wildcard	Boolean, free text, numeric range, phrase, query by example, sentence	Boolean, date range, free text, numeric range, phrase, wildcard	Boolean, date range, free text, numeric range, phrase, sentence, wildcard	Boolean, free text, phrase, sentence, wildcard
Save queries	☒	☒	☒	☒	☒	☒
Query method	Attribute, full text, HTML meta tag	Attribute, category, full text, HTML meta tag, keyword	Full text, keyword	Attribute, category, full text, keyword	Attribute, full text, HTML meta tag	Attribute, category, full text, HTML meta tag, keyword
RESULTS						
Sort method	Relevance	Alphabetical order, document attribute, relevance	Document attribute, relevance	Alphabetical order, document attribute, relevance	Alphabetical order, document attribute, relevance	Alphabetical order, document attribute, relevance
User-customizable search results page	☒	☒	☒	☒	☒	☒
Search-term highlighting	☒	☒	☒	☒	☒	☒
List price	\$15,999.95 (250 users)	Workgroup Edition, \$29,500 (1 server, 20 users); Enterprise Edition, \$97,500 (unlimited servers, 100 users)	Free	\$6,250	Free	\$995 (or as part of SuiteSpot bundle)
Company information	AltaVista Internet Software, 30 Porter Rd., Littleton, MA 01460; 800-336-7890; fax, 508-486-2017; www.altavista.software.digital.com/	Excalibur Technologies Corp., 1921 Gallows Rd., #200, Vienna, VA 22182; 800-788-7758, 703-761-3700; fax, 703-761-1990; www.xrs.com/	Excite Inc., 1091 N. Shoreline Blvd., Mountain View, CA 94043; 415-943-1200; fax, 415-943-1299; www.excite.com	Fulcrum Technologies Inc., 785 Carling Ave., Ottawa, Ontario, Canada K1S 5H4; 613-238-1761; fax, 613-238-7695; www.fulcrum.com	Microsoft Corp., One Microsoft Way, Redmond, WA 98052; 206-882-8080; fax, 206-936-7329; www.microsoft.com	Netscape Communications Corp., 501 E. Middlefield Rd., Mountain View, CA 94043; 415-937-2555; fax, 415-528-4124; home.netscape.com
Miscellaneous	Free evaluation download	Visual RetrievalWare indexes digital images and video	Full download available	Comes with MS Exchange option	Requires Windows NT Server 4.0 and MS Internet Information Server 2.0	Requires Enterprise Server; uses Verity search engine

resource for employees to waste cycles on, unless it represents a more efficient way to access and make sense of information.

If you're setting up an intranet, the first rule is: *Don't skimp on the search tools.* Search is no replacement for other means of guiding employee access to corporate data, such as the human expertise used to shape a hyperlinked topic structure. But setting up an efficient search system is less labor-intensive and easier to implement. Few intranets are so well organized today—at least in terms of their hypertext interfaces—that they couldn't benefit from a powerful search engine. For many, a search engine is more or less a necessity. Our advice: Head straight to the top and pick an intranet search-engine solution from Fulcrum Technologies, Microsoft Corp., Netscape Communications, Oracle Corp., or Verity. Before you get carried away, though, read what follows for a better understanding of the issues involved.

SEARCH PRIORITIES

Boolean searches, exact string matches, proximity searches, statistical interpretations, linguistic analysis, pattern recognition, fuzzy logic, semantic differentiation—yeow! With all the techniques available, what actually constitutes the best kind of search?

Combined search techniques. With regard to search techniques, separating the marketing terminology from the actual technology is often tough, but opting for a search engine that uses more than one trick is a good rule of thumb. The best search engines, such as Verity Search '97 (based on the company's Information Server), employ a battery of search techniques.

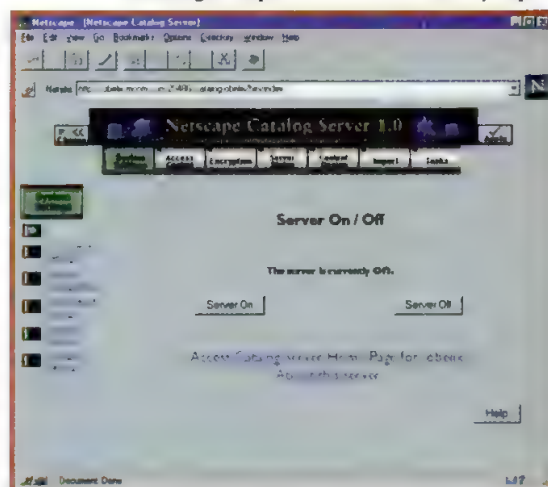
In reality, search technology is still something of a black art. The relevancy of search results is a function of two types of search activity: *recall* and *precision*. Recall is a measure of how well a search returns all available data pertaining to a search string. Precision is a measure of how well a search eliminates unwanted results in favor of closely matching the target information. Some search engines are better at one of these tasks than the other, but the most efficient strike a careful balance between the two.

Server indexing, not client search. Steer clear of simplistic, client-side solutions that might be used to run full-text searches over your LAN, potentially dragging down performance for all. The only reasonable intranet search strategy is a server-based engine that indexes the contents of intranet servers. When a user runs a search query, the engine rapidly consults one of its local indexes and responds with the appropriate descriptions and links. That's why search engines for intranets are usually

bundled with search server software.

Broad support for hardware/operating-system platforms. Some search engines are bundled in packages that work on only one or two server platforms. Microsoft Index Server, for example, runs only on Windows NT 4.0 Server. AltaVista Intranet Search PX runs on Digital Unix for Alpha or Windows NT for Alpha. You should plan for growth, in terms of both the new server hardware and software your company may add, as well as the potential expansion of your intranet into a broader multiple-server indexing role. The tendency is for the scope and role of successful intranets to grow more quickly than originally expected.

Server crawling and agents. What happens if your company suddenly realizes that seven other servers within the corporate domain, and two outside supplier sites, must be included in the intranet space? Some search-engine servers have no built-in facility for crawling and indexing multiple intranet servers. They expect

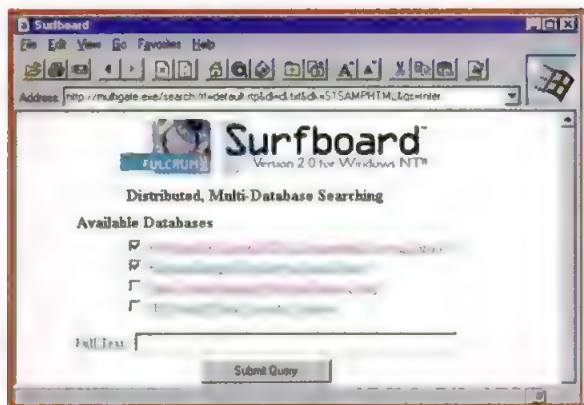


Netscape Catalog Server's search routines benefit greatly from a client-side presentation that's better than most.

to be the sole repository of intranet data. Others make this function an extra-cost option. If your company's IT needs tend to change rapidly, you should ask the following about a prospective search-engine server: Does it offer features, like scheduled indexing, that help cut down on bandwidth concerns when you expand your intranet? Can it be used to deploy agent software on the Internet to bring back specific types of information pushed onto desktops?

Data in documents. Know the data on your intranet and any data types that might be added if you expand later. Compare those document types with the file formats natively supported by the search-engine products you're considering. All of the search engines mentioned in this story can index HTML and ASCII text data. Most can also index information in files created by Microsoft Office applications and other major business programs. Some search companies sell these file filters separately. Others ex-

Oracle ConText Option	Verity's Search'97
AIX 4.1, BSDI 2.0, Digital Unix Irix 6.0, HP/UX 10.0, Solaris 2.4, SunOS, Unix, Windows NT 3.51 for DEC Alpha, Windows NT 4.0 for Intel	AIX 4.1, Digital Unix, HP/UX 9.0 or later, Irix 5.3 or later, Solaris 2.3 or later, Windows NT 3.51 or later
HTML, MS Office 95, PDF, SQL (ODBC), text, Web protocols	Documentum, Eudora, HTML, Lotus Domino, Lotus Notes, MS Exchange, MS Office, NetNews, Newswires, PC DOCS, PDF, SAP, SQL (ODBC and Oracle), text, Web protocols
■ (but no crawling tool)	■ (with optional Internet Spider module)
Chinese, Dutch, French, German, Italian, Japanese, Korean, Spanish, others	Chinese, Dutch, French, German, Italian, Japanese, Korean, Spanish, others
Boolean, date range, free text, numeric range, phrase, query by example, sentence, wildcard	Boolean, date range, free text, numeric range, phrase, query by example, sentence, wildcard
■	■
Attribute, category, full text, HTML meta tag, keyword	Attribute, category, full text, HTML meta tag, keyword
■	■
Alphabetical order, document attribute, relevance	Alphabetical order, document attribute, relevance
■	■
■	■
\$495 per ConText seat	Windows NT version, \$4,995; Unix version, \$7,995
Oracle Corp., 500 Oracle Pkwy., Redwood Shores, CA 94065; 415-506-7000; www.oracle.com	Verity Inc., 894 Ross Dr., Sunnyvale, CA 94089; 408-541-1500; fax, 408-541-1600; www.verity.com
Requires Oracle 7.3	Free evaluation download; comes with MS Exchange option; IntelliServe unavailable at press time



Fulcrum Surfboard isn't all that well known, but perhaps it should be. It placed a close second (to Netscape Catalog Server) on our price/performance matrix.

pect you to custom-build your own document-format support. If Adobe's PostScript Data Format is a data type on your intranet, consider the products from Fulcrum, Netscape, Oracle, and Verity. None of the other products in this story support .PDF. Secondary products from Fulcrum and Verity can access Microsoft Exchange e-mail data, and AltaVista Intranet Search PX can index files from both Exchange and Qualcomm's Eudora.

Many other companies have mission-critical data stored in database formats requiring support for SQL queries, ODBC queries, or both. Neither Microsoft's Index Server nor Netscape's Catalog Server offers native support for SQL database searches, although you may find a level of support in other servers in each company's lineup. The search-engine servers from Fulcrum, Oracle, and Verity are better choices for querying database data. Verity can handle Lotus Notes and Oracle data as well.

Finally, if image files form a big part of your corporate mindshare, look into Excalibur Technologies' Visual RetrievalWare. As Excalibur's marketing literature says, the technology lets users ask colleagues, "Seen anything like this?"

POSTPROCESSING

In many ways, the cutting edge of search technology is what search companies call postprocessing—that is, the options and steps users are offered after they receive initial results lists. No search hit list is ever likely to be just right. In large measure, its accuracy is dependent on how well the user knows both the topic being searched and the available data. Because that's often a chicken-or-egg scenario, the emphasis by most search-engine companies on postprocessing—so that users can specify broader, narrower, or just plain different search strings as part of a set of ongoing steps rather than as isolated shots in the dark—makes a lot of sense.

Nearly half of this battle is interface-related, because search engines haven't traditionally done a great job of presenting results to people. Query by example, often shown as a "More

Like This" button, is a merger of interface with a basic second-order processing of search results. The question is: By clicking that button, what exactly will users receive? Groupings by similar URL, similar phrasing, or what? Postprocessing requires a whole second search on the data, and there's no common way to understand what that process is, because different search engines work differently.

There's a trend toward a visual presentation of search results to help users more easily grasp groupings of data. Known by different names, visual representation of results is based on

clustering, or the grouping of search results. For example, if you search for "Washington," the search engine would seek to qualify search results into as many identifiable groups as possible—"State of Washington," "Washington, D.C.," "George Washington," "George Washington Carver," "Washington Redskins," and so on. That's the ideal, anyway. A new company called Semio recently announced a product called SemioMap, which offers some graphical results using a Java-based client that can be hosted on a Web page. Verity is also at work on visual clustering, as are other companies.

Two other means of helping users gain access to data more logically and rapidly center on different approaches. Netscape Catalog

Server 1.0 (which uses the Verity engine), SemioMap, Verity Search '97, and others focus on a technique that Verity's chief technology officer, Phil Nelson, calls "organize and navigate." Semio calls it a "discovery search," while Netscape says its product offers a Yahoo!-like presentation. Whatever you call it, the idea is to present hypertext topic headers in response to a search that users can navigate to find what they need on their own—and then possibly rerun a search once they find what they're after. The truth is, though, that this kind of approach works best when there is heavy editorial commitment from at least one knowledgeable person at your company, although Semio's automated approach is promising.

You can spread around and reduce the up-front work required to make your intranet effective by allowing end users to specify types of new content they'd like delivered to their desktops. Content delivery, also known as *push*, probably won't be much help when employees need to do exhaustive searches of historical corporate data. But at many companies, keeping up with what's current—both inside the firewall and out—is what's hardest for users. Acquired via Verity's merger with Cognisoft, Verity's IntelliServ, which was due in April, is among the more promising push tools designed to work in intranet environments. It uses a Web browser for both user configuration and content delivery but comes with zero prepackaged content of its own. Another option, PointCast's I-Server (www.pointcast.com), is a standalone intranet-oriented broadcast server and screen-

Other Notable Search Engines

If you check out other companies that have already implemented search-enabled intranets, you'll probably come across several additional

search-engine server products for intranets. Web-search service Excite (www.excite.com) offers a product line called Excite for Web Servers, which you can test for free. It's not specifically designed for intranet use, but it's being used that way at some companies.

Excalibur Technologies (www.xrs.com) is a longtime player in the search-engine field and worthy of consideration. Its comprehensive, \$29,500 RetrievalWare package contains a profiling server, a semantic- and adaptive-pattern recognition server, and a Web server. On paper, RetrievalWare's technology equals at least that of Fulcrum and Verity, and Excalibur claims that its proprietary search technologies yield far better text-search results. Its semantic network, which contains a dictionary and a thesaurus, gives users a

knowledge base of 400,000 word meanings and more than 1.6 million word relationships. Its Visual RetrievalWare is also on the short list of image-searching solutions.

Thunderstone's Webinator (www.thunderstone.com), a Web walking and indexing package, is one of the relatively silent partners of search. The company also offers a wholly concept-based search tool called Metamorph. Cadis's Krakatoa Catalog Publisher (www.cadis.com) is an object-oriented client/server solution with a Java-based (or HTML/JavaScript-based) client. It's best at searching and presenting catalog-type information. Frontier Technologies' CyberSearch information retrieval server (www.frontiertech.com) is freely available as a downloadable demo for Windows 95 and Windows NT. Two others, Semio's SemioMap (www.semio.com) and CompassWare's InfoMagnet (www.compassware.com), were in pre-release versions at press time, but both looked promising.

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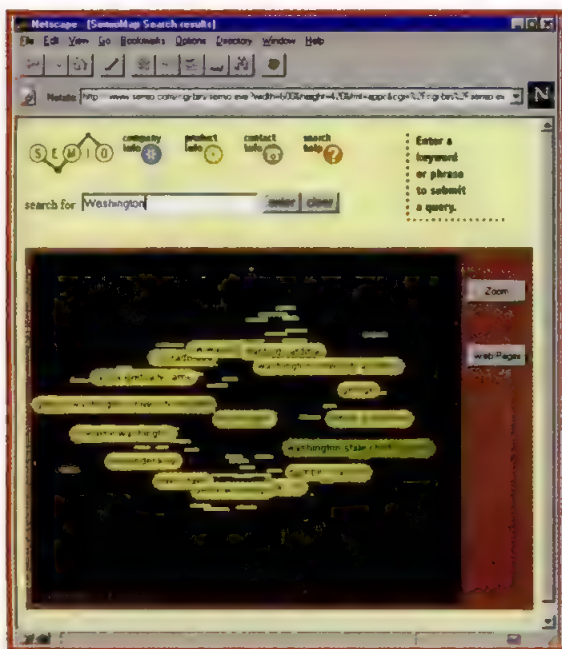
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Is this the future of search? Semio's wholly visual approach to presenting results and letting users narrow a search by double-clicking appears to be a true advance.

saver client software. It offers the advantage of excellent outside content, such as news on a variety of industries, but it also represents a whole new piece of 16-bit Windows or Mac client software to support on user desktops. Many other solutions are under development.

The keys to worthwhile content delivery on an intranet are self-profiling of user content interests; detailed, user-selectable content types; automatic delivery of content; and automatic user notification when content has arrived. The same sort of attention paid to search-result processing is useful for delivered content. Keep an eye on Netscape's forthcoming Internet desktop (code-named Constellation) and Microsoft Internet Explorer 4.0 Active Desktop. Both of these emerging Internet interfaces have been designed to receive pushed content, and they are apt to play giant roles in push on the intranet.

The last key to content delivery is smart agent technology, which lets an intranet search-engine server or a dedicated server on an intranet actively track down and pinpoint information in both the intranet and Internet space, without bringing back gobs of information for users to sort through. "Smart" features include active searching, watching for changes, and adapting to new content. Intelligence is also needed to let the agent software track acceptance and rejection of individual items and then use that additional input to retrain itself heuristically to search better in the future.

MAKING SENSE OF IT

Search is rapidly becoming a commodity item. It isn't so much that the market is generally

happy with the level of technology delivered; it's that no one search company has a truly significant technology advantage. And what's more, the demand for search capabilities is increasing significantly. Verity's technology, available at several corporate sites on the Internet, comes the closest to making it a perceivable front-runner. But its advantage doesn't derive from a secret weapon, just from more stick-to-itiveness and a good dose of corporate vision and wisdom. Verity also invests heavily in R & D.

Since much of what differentiates search engines are the tools their respective companies deliver to help a user narrow the initial results of a search, pay close attention to the "Results sorted by area" line of the table that accompanies this story. The more strategies employed to help a user narrow a search, the better. Highlighting original search terms may not sound like much,

but it goes a long way toward curbing user frustration. Query by example, noted in the "Query method" line of our table, is actually a results-processing function, although it can be so integral to some search interfaces that it might as well be an initial search technique.

Although query types are less useful in determining the efficiency of a search engine, the entries in the "Search query types" row of the table give you a good sense of the strategies the tools employ. In general, a highly focused search strategy like RetrievalWare's semantics-based approach may work exceedingly well with some kinds of data but not so well with others. Search engines that employ more varied approaches, such as Verity Search'97, are more consistently accurate across various types of data. But even that's a generalization. Our features table also shows whether a search-engine server is designed to index multiple servers via the addition of a crawling agent—either by default or by option. This is important to note if your intranet might one day grow.

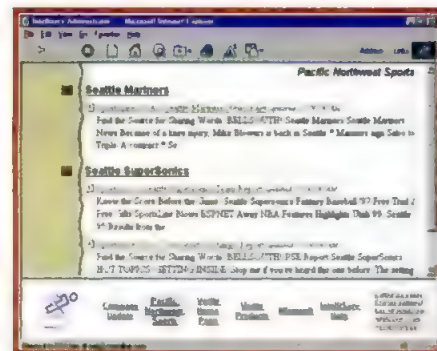
According to James Bair, research director at the Gartner Group, the best way search-engine server companies can differentiate over the next several years will be through service and support, market share, strategic alliances, company visibility, and international presence. He adds that industry consolidation is likely. If your intranet is anything more than a sideline project at your company, go with one of the bigger players, like Microsoft, Netscape, or Oracle. Focus on the infrastructure support and extensibility you need to maintain intranet search costs effectively.

The best intranet-search tool for your

company will very likely be wholly different from another company's ideal tool. Right now, Verity looks like the safest choice overall, but it might not be the best choice for your shop. Netscape offers the best price/performance value of the lot. The only factors missing from its equation are native database support and support for languages other than English (look for some improvement on these fronts with Netscape Catalog Server 2.0). And since it's only \$995, or free as part of SuiteSpot, the price is right. At \$6,250 to start out with, Fulcrum Surfboard 2.0 is an attractive option. Although Fulcrum is the least well known of the companies here, any perusal of its spec sheets will show that its product line matches up to Verity's better than any other competitors'.

Offered as freeware, Microsoft Index Server 1.1 is even cheaper, although it does require Windows NT 4.0 Server, and if that's an upgrade for you, you may owe money on a per-seat basis. Still, if most of your corporate data is in HTML or Microsoft Office applications, and hosting your intranet on a Windows NT server is what comes naturally, Microsoft's solution will be a no-brainer. Similarly, if you're already running Oracle's Oracle7 database engine, picking up the company's ConText Option will be second nature.

The strategic importance of intranets is increasingly being taken for granted. But to implement one that efficiently leverages your IT infrastructure while delivering on the promise of rapidly linking employees with invaluable corporate data, you need to include



IntelliServ, Verity's push-content tool for intranets, is administered and user-configured in the browser window.

some kind of search. More than any other tool, search provides drill-down access to data at speeds nothing else can match. At most corporate sites, installing anything more than a small vertical intranet knowledge base without including a server-side search tool is tantamount to buying a car without an engine; it rolls, it stops, you can even steer—but you're not going anywhere. Make sure you have the right tools, because without them your company might end up a lap or two behind the competition. □

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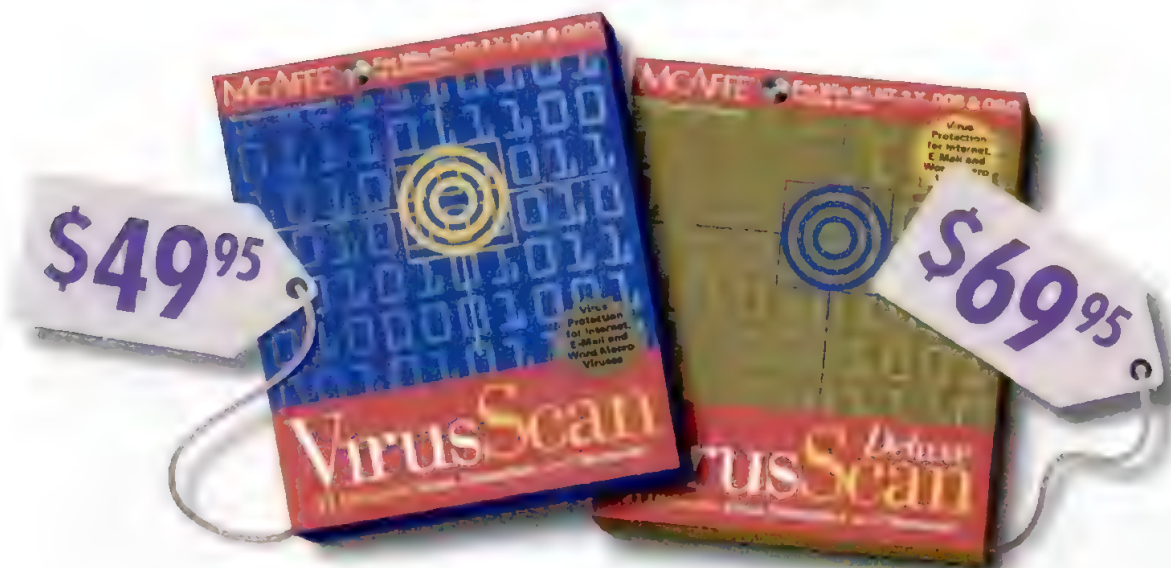


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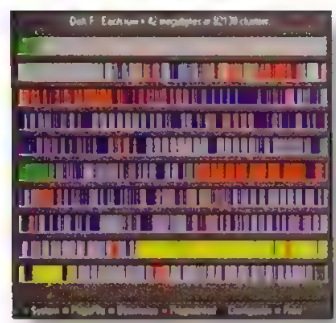
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By Sheryl Canter

Automating Log-Ons to the Internet

Windows 95's Dial-Up Scripting eases your Internet access.

For most Internet service providers (ISPs), you need only establish a Dial-Up Networking connection to dial in using Windows 95. That's because most ISPs use PPP (Point-to-Point Protocol) and require only a user name and password.

But that is not the case with all ISPs. And if your provider deviates at all from the norm, you have two choices: you can enter additional required information manually, or you can have the computer do it for you with Microsoft's Dial-Up Scripting. When to use the scripting tool, how to use it, and where to get it are the subject of this article.

If you use CompuServe as your ISP, then you are probably already familiar with Dial-Up Scripting. In fact, the tool comes with a script for connecting to CompuServe, which requires some additional information beyond user name and password when you connect. We will look at that script in detail a little later.

You will also find Dial-Up Scripting useful if you connect to your ISP with SLIP (Serial Line Internet Protocol) or CSLIP (Compressed SLIP), or if your ISP requires a menu selection before connecting you to the Internet. Without Dial-Up Scripting, you must connect to those types of providers manually.

FIRST THINGS FIRST

To use Dial-Up Scripting, you must first create a working Dial-Up Networking connection. The Dial-Up Networking icon should be in your Accessories folder. If it's not, open Control Panel, double-click on Add/Remove Programs, and click the Windows Setup tab. Select Communications, click the Details button, and check the box next to Dial-Up Networking to install it.

To confirm you have TCP/IP installed, double-click on the Network icon in Control Panel. A dialog box will appear. If TCP/IP isn't on the list in the dialog box, click the Add button. In the next dialog box, select Protocol and click the Add button. The next dialog box is two-paneled. Select Microsoft on the left under Manufacturers, and select TCP/IP on the right under Network Protocols.

To create a Dial-Up Networking connection, double-click on the Dial-Up Networking icon. This will open a virtual group, much like Control Panel. Double-click on the Make

New Connection icon and supply the information requested by the wizard. When you click the Finish button, Windows 95 will add a connection icon to the group with the name you chose in the wizard.

To configure your connection, right-click on its icon and select Properties. The Connect Using group at the bottom of the Properties page has two buttons, labeled Configure and Server Type. When you click the Server Type button, you will see a dialog box for setting server and TCP/IP parameters. Make sure their settings match the requirements of your provider.

Next, click the Configure button and choose the Options page. The group at the top of the page is called Configuration Control and includes two check boxes, labeled "Bring up terminal window before dialing" and "Bring up terminal window after dialing." The first option lets you change modem settings prior to dialing; the second lets you log on manually after a connection is established. If your ISP does not use PPP, or if you need to enter information beyond

your user name or password, you will need to check the second box—unless you are using Dial-Up Scripting to automate the process. In that case, make sure the box is not checked.

INSTALLING DIAL-UP SCRIPTING

There are two versions of Dial-Up Scripting. A stripped-down version shipped on the original Windows 95 CD-ROM, dated 7-11-95. A more capable version ships with the Plus! pack and can also be downloaded free from Microsoft's Web site. You can find it at www.microsoft.com/windows/software/admintools.htm. The enhanced version (dated 12-31-95) lets you create variables within the script and adds branching logic, with `if/then/else` syntax, a `while` loop, and a `goto` statement. The most common use of these advanced features is to create a loop that retries the log-on procedure a set number of times before quitting. But even if you

don't think you need such features now, you might as well download the later version, since it's free.

To install the standalone version of Dial-Up Scripting, open Control Panel, double-click on the Add/Remove Programs icon, select the Windows Setup tab, and click the Have Disk button. Then you can either type in the path to the file `Rnaplus.inf` or click the Browse button and search for it. If you are installing the version on the Windows 95 CD-ROM, the file is in the folder `Admin\Apptools\Dscript`. If you downloaded the enhanced version from Microsoft's Web site, unzip the self-extracting .ZIP file in a temporary directory and then look there for `Rnaplus.inf`.

To install the Plus! pack version of Dial-Up Scripting, check the Internet Jumpstart

Kit component during installation of the Plus! pack. If you've already installed the Plus! pack, make sure that component was installed. Open Control Panel, double-click on Add/Remove Programs, select Microsoft Plus! for Windows 95 from

the list of installed programs, and click the Add/Remove button. The Microsoft Plus! installation program will load. Click the Add/Remove button and you'll get a list of components. If Internet Jumpstart Kit is not already checked, check it now to install it.

USING DIAL-UP SCRIPTING

The icon for Dial-Up Scripting can be found in the Accessories folder. Double-click on it and you'll see the dialog box shown in Figure 1. The Dial-Up Networking connections you've created are listed on the left. Select the connection you'd like to automate and then enter the name of the script in the edit box on the right. Scripts are plain text files with the file type .SCP. They are stored in the folder `c:\Program Files\Accessories`. Dial-Up Scripting comes with four prewritten scripts: `Cis.scp`, `Pppmenu.scp`, `Slip.scp`, and `Slipmenu.scp`. You can modify any of them from within

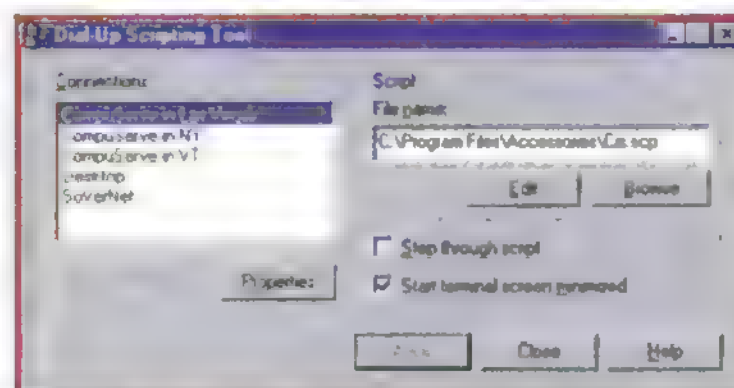


FIGURE 1: This is the Dial-Up Scripting dialog box, showing Dial-Up Networking connections.


```

;
; This is a script file that demonstrates how
; to establish a PPP connection with CompuServe,
; which requires changing the port settings to
; log in.
;

; Main entry point to script
;
proc main

    ; Set the port settings so we can wait for
    ; non-gibberish text.

    set port databits 7
    set port parity even

    transmit "^M"

```

```

waitfor "Host Name:"
transmit "CIS^M"

waitfor "User ID:"
transmit $USERID, raw
transmit "/go:pppconnect^M"

waitfor "Password: "
transmit $PASSWORD, raw
transmit "^M"

waitfor "One moment please..."

; Set the port settings back to allow successful
; negotiation.

set port databits 8
set port parity none

endproc

```



FIGURE 2: This is the basic script for automating log-on to CompuServe.

the scripting tool by selecting a script and pressing the Edit button; this will load the script into Notepad. Use Notepad—or any other editor capable of writing plain text files—to create new scripts, and save them in the c:\Program Files\Accessories folder with the file extension .SCP.

The CompuServe script, Cis.scp, is short and simple and thus provides a good place to start learning the scripting language (see Figure 2). Full documentation for the scripting language syntax can be found in a file called Script.doc, which is included with the applet—unless you're using the CD-ROM version of Windows 95. If you don't have the documentation file, you can download it from Microsoft's Web site.

All scripts must have a proc main statement and a matching endproc statement. These mark the entry and exit points, respectively, of the script. Comments are indicated by a semicolon; any text on a line following a semicolon is ignored.

The CompuServe script starts by using the set port commands to set the port to 7 data bits and even parity, the settings used by CompuServe. You can manually log on without changing the port from the 8 data bits and no parity required for the PPP connection, but if you do, the prompts will contain nonsense characters—okay for you, but confusing for a script.

After setting the port, the script transmits a carriage return, represented by "^M," so that CompuServe will respond by prompting for the host name. The script waits for the "Host Name:" prompt, and then transmits "CIS" followed by a carriage return. Next the script waits for the "User ID:" prompt. The user name is transmitted using the system variable \$USERID, which holds the user

name you typed in the dialog box when you started the Dial-Up Networking connection. The parameter "/go:pppconnect" and a carriage return are transmitted on the next line of the script.

Next the script waits for the "Password:" prompt and transmits the password when the prompt is detected. Again, the script uses a system variable, \$PASSWORD, which contains the password you typed in the dialog box when you initiated the Dial-Up Networking connection. It's a good idea to use these system variables, rather than hard-code the information in your script. Any information you hard-code in a script is stored in an unprotected text file, where anyone can see it.

The final step, after the message "One moment please..." is detected, is to switch the port back to 8 data bits and no parity, for PPP negotiation.

The CompuServe script works just fine without any modification, but when you are writing your own scripts, you will probably need to do some testing and tweaking before your script works just the way you want. To watch a script as it executes, uncheck the check box labeled "Start terminal screen minimized." If you need to step through your script to find a problem, check the check box labeled "Step through script." That will bring up a dialog box like the one shown in Figure 3. Each click of the Step button will execute the next line

in the script. You can watch the effect of each statement in the terminal window.

To write a script for your ISP, you must first go through the log-on procedure manually, using the terminal box option for the Dial-Up Networking connection described above. Carefully note every prompt and keystroke, then modify one of the sample scripts to match the prompts and entry requirements of your ISP.

Figure 4 shows a more complicated script, called Ppp.scp, which I modified from the sample script Slip.scp. This script establishes a PPP connection to my Internet provider. I don't actually need to use a script, because my ISP requires only a user name and password, but it provides some error checking and retry capabilities beyond what I would normally have, and it demonstrates the use of variables and loops.

The Dial-Up Scripting language supports

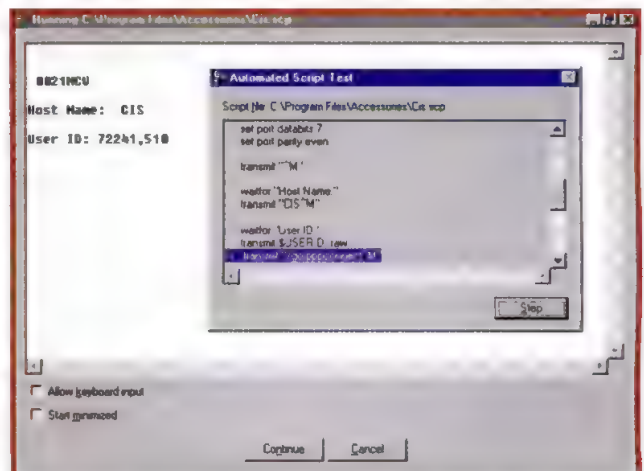


FIGURE 3: By clicking on the Step button in this dialog box, you can execute your script one line at a time, making it easier to find errors.

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```

proc main

    string szLogin = "login:"
    integer nLoginTimeout = 3

    string szPW = "Password:"
    integer nPWTimeout = 3

    integer nTries = 3

    while 0 < nTries do

        waitfor szLogin then DoLogin
            until nLoginTimeout

    TryAgain:
        transmit "^M"          : ping
        nTries = nTries - 1

    endwhile

    goto BailOut

DoLogin:
    transmit $USERID, raw
    transmit "^M"

    waitfor szPW until nPWTimeout
    if FALSE == $SUCCESS then
        goto TryAgain
    endif

    transmit $PASSWORD, raw
    transmit "^M"

    goto Done

BailOut:
    ; Something isn't responding. Halt the script
    ; and let the user handle it manually.

    set screen keyboard on
    halt

Done:

endproc

```



FIGURE 4: This modified version of the sample script *Slip.scp* adds some error-checking and retry capabilities.

three types of variables: string, integer, and Boolean. All variables must be declared and initialized before they are used, so that is what comes first. The variable `szLogin` is declared as a string and initialized to "login:"—my ISP's log-on prompt. That's the string for which the script will wait before sending my user name. The integer variable `nLoginTimeout` is set to 3 seconds; that is how long the script will wait for the prompt string before timing out. The password prompt is handled the same way.

The heart of the script is a `while` loop. The script waits for up to 3 seconds for the log-on

prompt. If the prompt is not received before the time-out, execution will drop down to the `TryAgain` portion of the loop. The script will transmit a carriage return, decrement the counter `nTries`, and then reenter the `while` loop.

The variable `nTries` is initialized to 3, so the script will try again only up to three times. When `nTries` is decremented all the way to 0, the `while` test will fail and control will pass to the statement following the `endwhile` statement, `goto BailOut`. The statements following the label `BailOut` halt the script, giving you manual entry of commands through the keyboard.

If the log-on prompt is detected within three tries, the script jumps to the label `DoLogin` and continues executing there. The first statement after `DoLogin` transmits the user name. The parameter `raw` means the user name will be transmitted as text, even if there are embedded carets or slashes that could be interpreted as escape codes.

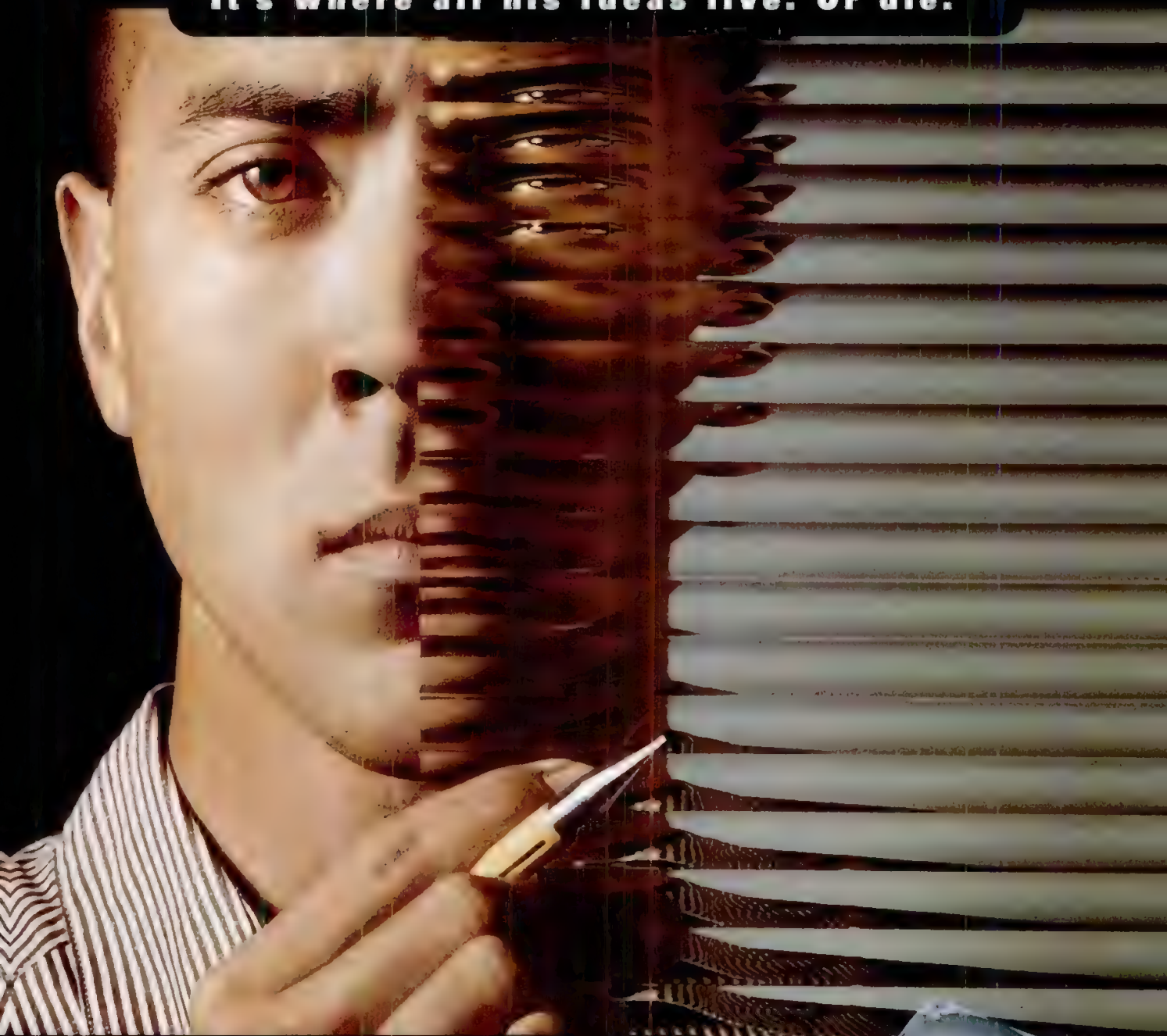
Next the script waits for the password prompt. The Boolean system variable `$SUCCESS` is set by certain commands (including `waitfor`) to indicate whether they succeeded. If the password prompt is not detected, the script jumps to the label `TryAgain`. If the prompt is detected, the password is transmitted, control jumps to the label `Done`, and the script ends.

As mentioned above, Dial-Up Scripting comes with three sample scripts in addition to the CompuServe script. `Slipmenu.scp` demonstrates how to establish a PPP connection to a

provider that uses a menu. `Slip.scp` demonstrates how to establish a SLIP connection, and `Slipmenu.scp` shows how to establish a SLIP connection to a provider that uses a menu system. You can find other sample scripts—perhaps one for the very provider you use—at the windows95.com Web site (www.windows95.com/connect/sampscrp.html). The site, which is not affiliated with Microsoft but is very useful just the same, offers over two dozen sample scripts. □

Sheryl Canter is a contributing editor of PC Magazine.

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PC Tech/Power Programming

By Jeff Prorise

Power MFC Programming

Three insider's tips make your applications more professional-looking.

What's the secret to writing good code? A big part of it is knowing the language in which you're working. And if you use a class library, it's just as important to know that class library inside and out.

Many Windows programmers who work in C++ have settled on MFC as their class library of choice, and with good reason: It's a full-featured class library that wraps much of the Windows API into reusable C++ classes. Combined with the visual programming tools built into Microsoft Visual C++, MFC helps you write a lot of code in a little time.

But good code is never accidental. A programmer who spends a lot of time with MFC picks up tricks and techniques for writing better applications. For example, did you know that with just four lines of code, you can get rid of the unsightly flashing that occurs in a view when the frame window surrounding it is resized? Or that there's a simple technique you can use to make print previews more realistic?

These are but a couple of the tricks I've come to rely on to make the Windows applications I write with MFC as robust and professional-looking as possible. This column discusses three interface-tweaking techniques for use in your MFC C++ applications, and in the next Power Programming column we'll cover three more.

ELIMINATE UNNECESSARY FLASHING

Before MFC creates a view and places it inside a frame window, it registers a window class (WNDCLASS) that specifies certain of the view's properties, one of which is a WNDCLASS style that instructs Windows to invalidate the entire view whenever the view is resized horizontally or vertically.

Repainting the entire view in response to size changes is fine for some applications, but for most it's excessive. Suppose you're writing a spreadsheet application whose `OnDraw()` function draws a rectangular array of cells. When the view is enlarged, `OnDraw()` needs to paint the part of the view exposed by the resizing, but it doesn't need to repaint the part that was already visible. In such a case, the default

WNDCLASS styles produce an unseemly flashing effect, because the entire view is erased before it is redrawn.

You can eliminate unnecessary repainting by stripping the `CS_HREDRAW` and `CS_VREDRAW` bits from the view. How? Simple: Add an `OnCreate()` handler to your view class and include in it the following code:

```
DWORD dwStyle =  
::GetClassLong (m_hWnd, GCL_STYLE);  
::SetClassLong (m_hWnd, GCL_STYLE,  
dwStyle & ~(CS_HREDRAW |  
CS_VREDRAW));
```

Now here's the trick. The above code won't do you the least bit of good unless you also strip the redraw bits from the frame window that surrounds the view. In an SDI application, you'd apply the same code to the `CFrameWnd`-derived class that represents the application's top-level or "main frame" window. In an MDI

application, when a user selects the Print Preview command from the File menu, the MFC application framework calls your view's printing and drawing code with a pointer to a `CDC` object whose output device context (DC) refers to the screen instead of the printer. The result? Your view thinks it's sending output to the printer, but in reality output goes to the print preview window instead.

That's all fine and good, but there's one thing that bothers me about MFC's print preview logic. If the printer is a black-and-white model, print previews are still drawn in color. That's not very realistic or useful. It seems to me that a print preview for a noncolor printer should be drawn in shades of gray.

Fortunately, there's a simple technique that you can use to render print previews in shades of gray when your target printer is a black-and-white device, as Figure 1 shows. Just write your `OnDraw()` or `OnPrint()` function so that when it's called during print preview, it

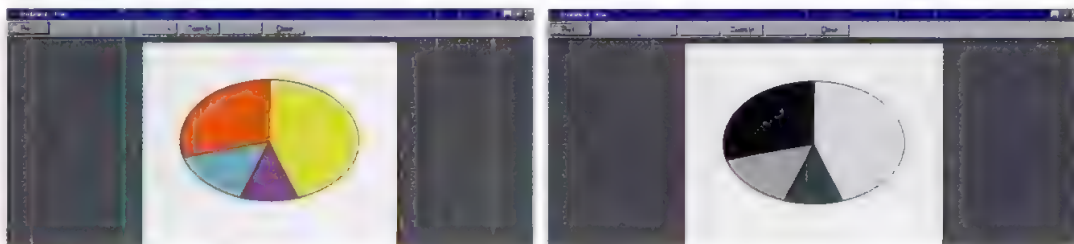


FIGURE 1: On the left, a normal print preview window; on the right, an enhanced print preview window with output rendered in shades of gray.

application, you'd apply it to the `CMDIChildWnd`-derived window class instead. Once the modifications are made—that is, once you've stripped the redraw bits from both the view's WNDCLASS and the frame window's WNDCLASS—repaints will be performed much more cleanly when a window is resized.

You would not want to use this trick if your windows content must be resized or repositioned whenever the window size changes. An example would be an application containing an image whose size is proportional to the window size.

IMPROVING PRINT PREVIEWS

One of the magical features of MFC is that when you add printing support to a document/view application, you get print preview-

uses gray-scale brushes and pens. RGB color values can be converted to gray scale using this simple formula:

```
gray = ((red*30)+(green*59)+(blue*11)) / 100
```

Before converting brush and pen colors to gray, you'll want to query the selected printer and make sure it isn't a color model. That's easy, too. Just take the `CDC` object passed by reference to `OnPrint()` or `OnDraw()` and call the `CDC::GetDeviceCaps` function like this:

```
int nColors =  
pDC->GetDeviceCaps (NUMCOLORS);
```

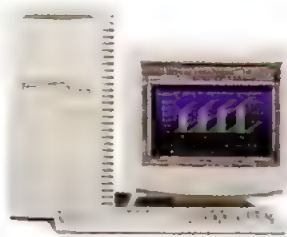
If `GetDeviceCaps` returns 2, then the target-

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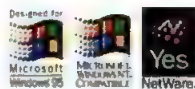
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```

void CMyView::OnDraw (CDC* pDC)
{
    CBrush brush;
    if ((pDC->GetDeviceCaps (NUMCOLORS) == 2) &&
        (pDC->m_hDC != pDC->m_hAttribDC))
        brush.CreateSolidBrush (RGB (76, 76, 76));
        // Grayscale red
    else
        brush.CreateSolidBrush (RGB (255, 0, 0));
        // Genuine red

    CBrush* pOldBrush = pDC->SelectObject (&brush);
    pDC->Ellipse (0, 0, 400, 200);
    pDC->SelectObject (pOldBrush);
}

```

FIGURE 2: An OnDraw function that draws print previews in shades of gray when the target printer is a black-and-white device.

ed printer is a two-color (black-and-white) output device.

Figure 2 shows an OnDraw() function that draws a red ellipse in the upper-left corner of the view. During print preview, if the targeted printer is a monochrome device, the same OnDraw() function draws the ellipse in the grayscale equivalent of red, RGB (76, 76, 76). The key is the if clause, which creates a gray brush rather than a red brush if GetDeviceCaps()

indicates the printer is a two-color device and the two DC handles stored in the CDC object referenced by pDC are not equal—a sure sign that OnDraw() was called to draw a print preview.

A final note: If your application does its printing from OnPrint() rather than OnDraw(), you needn't test the DC handles. Instead, you can check the m_bPreview flag in the CPrintInfo object whose address is passed to the view's OnPrint() function. A nonzero m_bPreview value means print previewing is being performed; 0 means output really is going to the printer.

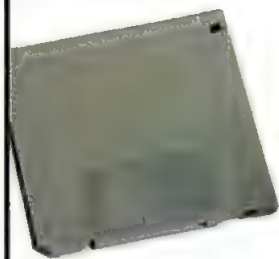
PREDICTING PAGE BREAKS

While we're on the subject of printing, there's another deficiency in MFC's printing architecture that you can correct with just a few lines of code. When a user prints a document, MFC calls several virtual functions in the application's view class. The first function called is OnPreparePrinting(). Most implementations of OnPreparePrinting() do little more

than call MFC's CView::DoPreparePrinting() function, which displays a Print dialog on the screen and creates a printer device context. A more robust implementation calls CPrintInfo::SetMaxPage() before it calls DoPreparePrinting(), so that MFC can display the page count in the "to" field of the Print dialog's Print Range box. Otherwise, the field is left blank, and the user has no idea how many pages will be printed.

It follows that you should make it a practice to call SetMaxPage() through the CPrintInfo pointer passed to OnPreparePrinting(), in order to inform MFC of the page count. But there's a problem. Very often, the printed document length depends on the printable page area. But before the Print dialog is displayed, you don't know which printer the output will go to. That's why a view's OnBeginPrinting() function receives a pointer to a printer DC, but OnPreparePrinting() does not. It's a classic chicken-and-egg scenario.

So how do applications such as Word and Excel fill in the "to" box? For that matter, how does MFC know where page breaks will fall during print preview, when it doesn't know which printer the output will go to? The answer is that it doesn't. To compute page break locations for print previews, MFC makes certain assumptions about the printable page based on which printer is the default



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```

BOOL CAccelView::OnPreparePrinting (CPrintInfo* pInfo)
{
    // Compute the page count.
    //
    if (!pInfo->m_bPreview) {
        CPrintInfo pi;
        if (AfxGetApp()->GetPrinterDeviceDefaults (&pi.m_PPD->m_pd)) {
            HDC hDC = pi.m_PPD->m_pd.hDC;
            if (hDC == NULL)
                hDC = pi.m_PPD->CreatePrinterDC ();
            if (hDC != NULL) {
                CDC dc;
                dc.Attach (hDC);
                int nWidth = dc.GetDeviceCaps (HORZRES); // Page width
                int nHeight = dc.GetDeviceCaps (VERTRES); // Page height

                // TODO: Compute nPageCount from nWidth and nHeight

                pInfo->SetMaxPage (nPageCount);
                ::DeleteDC (dc.Detach ());
            }
        }
    }
    // Display the Print dialog and create a printer DC.
    //
    return DoPreparePrinting (pInfo);
}

```

FIGURE 3: An *OnPreparePrinting* function that computes a page count using information about current and default printer settings.



and what settings have been entered into the Print Setup dialog.

You can use the same technique in your own code to predict where page breaks will fall and compute a page count in *OnPreparePrinting()*. Figure 3 shows how. This "smart" implementation of *OnPreparePrinting()* creates a printer DC using the default printer attributes and, if applicable, the most recent settings, including the printer selection and page orientation (portrait or landscape) entered into the Print Setup dialog. Then it uses *GetDeviceCaps()* to measure the printable page area, from which it computes a printed document length. Note that the printable page area can vary widely, depending on the type of printer, the printer driver, and the page orientation. The *nWidth* and *nHeight* values computed in Figure 3 take all of these factors into account.

That's it for now. I hope you'll find these tips helpful in your MFC programs. Join us again next time, when we'll look at how to create custom view classes based on built-in controls, tweak the document/view architecture, and more. □

Jeff Prosise is a contributing editor of PC Magazine and the author of *Programming Windows 95 with MFC*, published by Microsoft Press.

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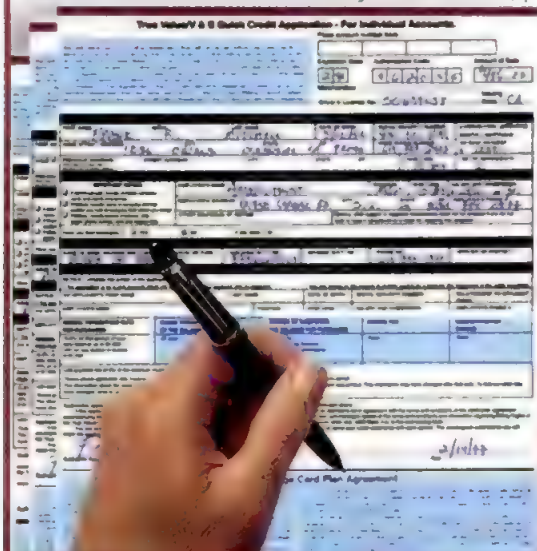
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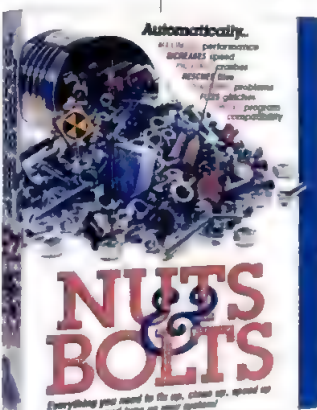
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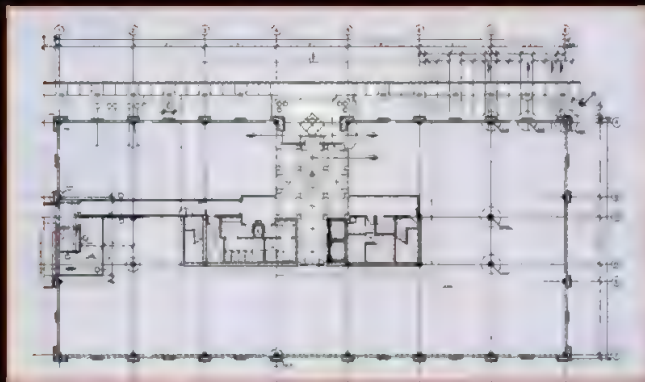
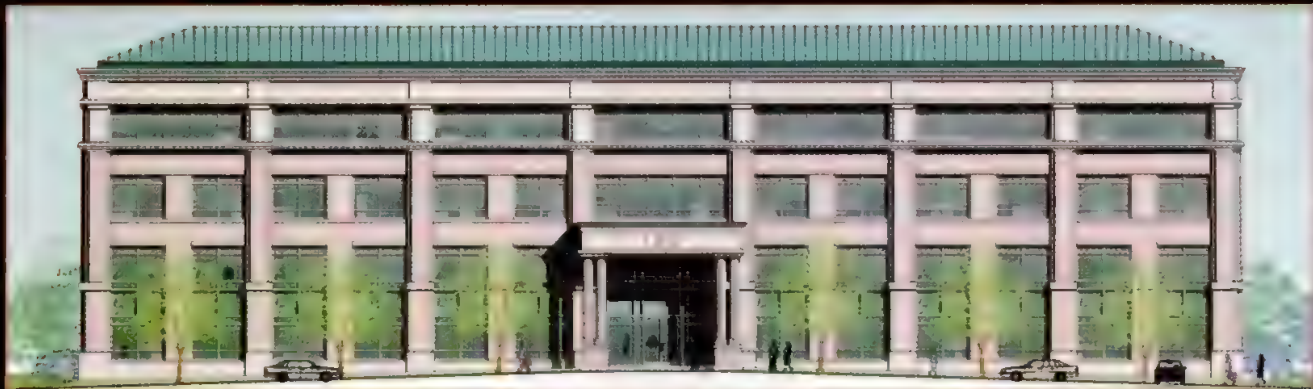


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PC Tech/Utilities

By Zan Oliphant

Change Your Keyboard Layout

ZDKeyMap can remap or disable any of the standard keys.

There are many reasons why you may want to remap the keys on your keyboard. Accidentally pressing the Caps Lock key is an annoyance to many people. Turn the Caps Lock key into a Shift key or swap it with the Left Ctrl key and the problem is gone. Or maybe you'd like a way to switch your QWERTY keyboard layout to the more efficient Dvorak layout. Or perhaps you have a notebook computer that lacks F11 and F12 keys, but you need them for a program you use. Wouldn't it be nice to have a utility that let you pick a key you don't use often, and turn it into a missing key that you really need?

Microsoft's KeyRemap utility, one of the Kernel Toys, can handle only the Caps Lock, Alt, Ctrl, and Shift keys, so its usefulness is limited. In contrast, this issue's utility, ZDKeyMap, lets you remap any of the standard keys on your keyboard. You access ZDKeyMap through a new property page called Key Mapping in the Control Panel's Keyboard applet. Simply select the key you want to reassign from the list box on the left, and then select the new assignment from the list box on the right. When you click the Apply button, the key will be remapped.

You can obtain ZDKeyMap by downloading it from PC Magazine Online or by mail (see the sidebar "Getting the Files" for details). The source code for the utility, which was written in Microsoft Visual C++ 4.0, is also available for those interested.

USING ZDKEYMAP

The ZDKeyMap program includes three files: Zdkeymap.dll, Vkeymap.vxd, and Zdkeymap.inf. Place these three files in the same folder and click on Zdkeymap.inf within Explorer. Select Install from the context menu and Windows will copy the files to their appropriate destinations. Because of a limitation in Win-

dows 95, the full pathname of the folder that contains the files must contain only old-fashioned 8.3 DOS-style filenames. If the pathname is invalid, you will get the following error message while installing: "The disk labeled 'ZDKeyMap Disk' is now required." If you get this message, cancel the installation and try again using a folder whose full pathname contains only DOS-style filenames.

Once the installation is complete, you will need to restart Windows, even though the new property page will already be in place in the Keyboard applet. This is necessary to load the second component of the utility, the VxD,

IN THIS ISSUE

ZDKeyMap

ZDKeyMap adds a property page to the Control Panel's Keyboard applet, allowing you to remap all the standard keys on your keyboard. For example, you can avoid accidentally pressing Caps Lock by swapping it with the Left Ctrl key.



which communicates with the controls on the property page so they actually do something. When your system is done rebooting, open the Control Panel and double-click on the Keyboard icon to bring up the keyboard properties. You will see a new tab called "Key Mapping." Click on that tab and you will see the ZDKeyMap property page, as shown in

Figure 1. The property page contains two list boxes: the list box on the left displays the original key definition, and the list box on the right shows the current key mapping.

To change a key mapping, select the key you want to change in the left-hand list box, and then select the key you'd like it to map to in the right-hand list box. Your change is not recorded until you click the Apply button. So, for example, to change your Caps Lock key into a Shift key, you'd select Caps Lock in the left-hand list box, then select Left Shift in the right-hand list box, and click Apply. When you change a key mapping, the remapped key is marked with an asterisk in the left-hand list box.

The keys are presented in logical groupings to make them easy to find, but you can also jump to a key immediately. To find a key quickly, click anywhere in a list box to make it the active control, then press the first letter of the name of the key you want to find. Press the same letter again to find the next key that begins with that letter. This technique will work in both the left-hand and right-hand list boxes.

Below the two list boxes are four buttons: Swap, Restore Defaults, About, and Help. The Swap button is convenient for switching two keys. For example, let's say you want to switch your Caps Lock key and your Left Ctrl key. First remap Caps Lock to Left Ctrl. Then click Swap, and ZDKeyMap will automatically remap Left Ctrl to Caps Lock. Click Apply to register the change. To restore the original mapping, click the Restore Defaults button and then click Apply. The About button brings up copyright information, and the Help button displays some helpful hints for using ZDKeyMap.

To uninstall ZDKeyMap, open the Control Panel, double-click on Add/Remove Programs, select ZDKeyMap from the list of installed programs, and click the Add/Remove button. That's all there is to it!

FOR PROGRAMMERS ONLY ZDKeyMap, written with Microsoft Visual C++ 4.0, is a Win32 property sheet handler, based on COM, and a Windows 95 VxD. Both components use the system Registry to store and read keyboard mappings. Source code for ZDKeyMap is available on PC Magazine's Web site and demonstrates the following programming techniques:

- using a device information (.INF) file to install a program;
- creating a simple virtual device driver (VxD); and
- communicating with an active VxD using DeviceIoControl.

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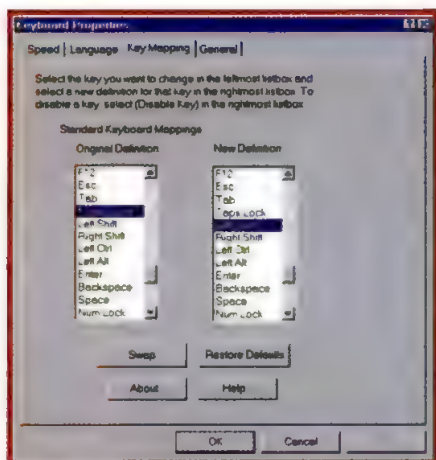


FIGURE 1: ZDKeyMap adds a property page to the Keyboard applet in the Control Panel.

A WORD ABOUT EXTENDED KEYS

You may notice that certain keys are missing from ZDKeyMap's key list. The keys that are missing are the *extended keys*. ZDKeyMap can handle only standard keys. Figure 2 shows which keys belong to the extended group.

In general, the extended keys are those that were added after the IBM XT was released, though there are some exceptions. The XT keyboard had no arrow or edit key clusters; arrow and edit keys were located only in the numeric keypad. The familiar 101-key multifunction keyboard, which was introduced with the IBM AT, provides separate arrow and editing keys in addition to the ones located in the numeric keypad. Other additions include numeric keypad slash (/) and Enter keys, and Right Alt and Right Ctrl keys.

What actually defines a key as extended is how it works internally. When you press a standard key (as opposed to an extended one), the keyboard generates and sends to your PC a single byte, called a *scan code*, that uniquely identifies the key that you pressed. This is how your system software knows what you have typed. Extended keys, however, are identified by a whole sequence of scan codes which can change depending on the state of the NumLock and Shift keys. This makes them much harder to identify and remap.

Extended keys work this way to maintain software compatibility. For example, the arrow and edit key clusters must emulate the corresponding keys on the numeric keypad. Let's use the Up Arrow key to see how this works. Both the numeric keypad Up Arrow and the arrow cluster Up Arrow generate a scan code of 72. But on the numeric keypad, when NumLock is enabled or Shift is pressed, the keyboard driver interprets the key as the number 8. This is not appropriate for the Up Arrow within the arrow cluster. To work around this problem, the multifunction keyboard sends implicit Shift sequences for extended keys, depending on the status of the

NumLock and Shift keys. In addition, an extended escape code (224) is inserted before each extended scan code so the keyboard driver can determine which key was really pressed. See Figure 3 for a comparison of the scan codes generated by pressing the extended Up Arrow key and the standard Up Arrow key when NumLock is enabled.

Not all the extended keys originated with the multifunction keyboard, however. The PrtSc key was on the original XT keyboard, but when SysRq was added as the shift value of this key, it became an extended key. The Break key was also on the original XT keyboard, but it was not combined with Pause. The Pause/Break key generates two scan codes when pressed (Left Ctrl [29] and NumLock [69]) in addition to the extended escape sequence. This is because it is emulating the way XT and AT keyboards worked. On these older keyboards, you paused a program by pressing Ctrl-NumLock. Multifunction keyboards let you pause a program with a single keystroke (the Pause/Break key, which generates the scan codes for Left Ctrl and NumLock).

Lastly, not all the keys introduced with the multifunction keyboard are extended. The exceptions are F11 and F12, which use entirely new scan code values (87 and 88). Since F11 and F12 are not emulating keys that existed on the original XT keyboard, they are not extended keys.

As you'll read later, ZDKeyMap uses a technique for keyboard mapping that allows it to change or delete a given scan code, but not to add scan codes as would be required for mapping extended keys. It is possible to do this, but it's difficult and beyond the scope of this utility.

THE DEVICE INFORMATION FILE

ZDKeyMap requires no installation or removal code. This entire process is handled by the Windows 95 Device Manager, which uses a built-in installer for the keyboard control panel class. The default installer requires a device information (.INF) file so that it knows where to put the files, what to add in the registry, and what the Globally Unique Identifier (GUID) of the new COM class is. An .INF file is similar to the old Windows .INI file in that each .INF file is made up of named sections. Each named section has a particular purpose, such as specifying a destination directory or registry entry.

The first section in Zdkeymap.inf is called ZDKeyMapInstall. This section specifies which files to copy: Zdkeymap.dll, Zdkeymap.inf, and Vkeymap.vxd. These same three files are also specified in the uninstall section, DefaultUnInstall. Zdkeymap.dll is the keyboard property sheet extension, Zdkeymap.inf is the device information file, and Vkeymap.vxd is the virtual device driver that does the actual key mapping. These same three files must be specified in a section called SourceDisksFiles, which specifies where each file is located at installation time.

Here is how the SourceDisksFiles section looks for ZDKeyMap:

```
[SourceDisksFiles]
ZDKeyMap.dll=1
ZDKeyMap.inf=1
VKeyMap.vxd=1
```

The number 1 is the ordinal of the source disk that contains the file. Another section called SourceDisksNames must be specified to provide the name of the source disk and the



FIGURE 2: The extended keys (highlighted) are not handled by ZDKeyMap.

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CIRCLE 176 ON READER SERVICE CARD

ordinal of that name. As shown below, the disk is named ZDKeyMap Disk and is given an ordinal value of 1 (the ZDKeyMap installation has just one disk):

```
[SourceDisksNames]
1="ZDKeyMap Disk", "", 1
```

Another section, called DestinationDirs, tells the Device Manager where to put each of the three file types. It looks like this:

```
[DestinationDirs]
ZDKeyMap.Files.Ext = 11, ShellExt
ZDKeyMap.Files.Inf = 17
ZDKeyMap.Files.Sys = 11
```

Those file types were mapped to the actual filenames like this:

```
[ZDKeyMap.Files.Ext]
ZDKeyMap.d11

[ZDKeyMap.Files.Inf]
ZDKeyMap.inf

[ZDKeyMap.Files.Sys]
VKeyMap.vxd
```

Each number corresponds to a well-known location within the Windows directory hierarchy. ZDKeyMap uses the number 11 to specify the Windows System subdirectory and the number 17 to specify the Windows INF subdirectory. There are many more defined numbers; you can find them on the Microsoft De-

strings in the registry information section.

Each registry statement is prefaced with a shorthand notation for a Windows registry root name. These short keys are defined like this:

```
HKCR = HKEY_CLASSES_ROOT HKCU =
HKEY_CURRENT_USER HKLM =
HKEY_LOCAL_MACHINE HKU = HKEY_USERS
```

ZDKeyMap puts its uninstall information and specifies a shell extension in HKEY_LOCAL_MACHINE. The keyboard shell extension is installed with the following registry subkey:

```
"Software\Microsoft\Windows\Current
Version\ControlsFolder\Keyboard\
shell\PropertySheetHandlers\
ZDKeyMap"
```

Putting a ZDKeyMap section in Keyboard\shell\PropertySheetHandlers lets Windows know that we have installed a new keyboard shell extension, that it is a property sheet extension, and that Windows should load our COM DLL whenever the Keyboard properties are brought up in the Control Panel.

To make Windows load Vkeymap.vxd during the Windows boot process, the VxD must be specified as a StaticVxD in HKEY_LOCAL_MACHINE. The INF string that makes Windows aware of our VxD looks like this:

```
"System\CurrentControlSet\Services\VxD
\VKeyMap", StaticVxD, "VKeyMap.vxd"
```

That Registry entry instructs Windows to load our VxD (Vkeymap) during system initialization. You can use the Windows Registry editor (Regedit.exe) to look at all statically loaded VxDs. There are over 50 of them and they range from things like WinSock (driver level) to your BIOS. Check it out, but be careful not to muck anything up—that's an easy way to ruin your day!

In addition to telling Windows when to load the COM object and VxD, the .INF file registers a new class for that COM DLL. This is done by putting a new key under the CLSID (Class ID) key that is under the HKEY_CLASSES_ROOT key where Windows stores classes. This new key is simply our GUID, generated by Microsoft's Uuidgen.exe tool as

```
{bed8bec0-6ec6-11d0-8192-444553540000}
```

The Registry entries installed by the .INF file for the above GUID tell Windows where it can find the actual DLL that implements the ZDKeyMap class. They also define our class as an in-process 32-bit COM server and define the class threading model. Now Windows can link the new class (ZDKeyMap) with a physical file (the DLL) and load it when needed.

THE PROPERTY SHEET EXTENSION

ZDKeyMap's user interface is a Windows shell extension implemented with a Dynamic Link Library (DLL) based on the OLE Component Object Model (COM). COM lets you create binary (rather than source-level) classes for use in object-oriented software design. This frees developers from any particular language (such as C++), while still allowing reuse of code modules. The ZDKeyMap's COM object is implemented as an in-process server called by the shell for property sheet extensions (IShellPropSheetExt). I won't go into the details here of how this is done, since shell extensions have been covered in many articles in this magazine and others.

Once the shell extension object, CSShellExt, is created and the shell has a pointer to it, the shell can call CSShellExt::AddPages so that our component code can create and add a new property sheet page to the Keyboard properties.

The left-hand list box on the property sheet contains the list of remappable keys, and the right-hand list box indicates the mapping for the selected key. There is a maximum of 256 distinct scan codes (though in practice fewer than 128 are used) so ZDKeyMap stores the mappings in a 256-element array called KeyMappings. Each element in the array corresponds to a keyboard scan code and holds the mapping for that key.

When the property page dialog box is initialized, the array is filled using a call to the API function RegQueryValueEx. When the user selects a remapping in the right-hand list box, the new scan code is stored in the KeyMappings array at the location indexed by the key's original scan code. When the user applies the change, ZDKeyMap records the change in the Windows registry. It also informs the driver of the change by opening a handle to the VxD, passing it the KeyMappings array using Win32's DeviceIoControl, and then closing the handle. Here's how that looks:

```
hVxD = CreateFile ("\\\\.\\VKEYMAP",
0, 0, NULL, CREATE_NEW, 0, NULL);

int rc = DeviceIoControl (hVxD,
IOCTL_NEW_MAPPINGS,
KeyMappings,
sizeof (KeyMappings),
NULL, 0,
&ulBytesReturned, NULL);

CloseHandle (hVxD);
```

The API function CreateFile takes as its first parameter a pseudo-UNC filename representing the driver and returns a handle to the VxD. This handle is used in the DeviceIoControl call, which sends a privately defined IOCTL message (IOCTL_NEW_MAPPINGS), along with the address and size of the KeyMappings array, to the driver.

UP ARROW SCAN CODES

Extended Up Arrow scan code sequence

224	Extended escape
42	Implicit Shift press
224	Extended escape
72	Up Arrow press
224	Extended escape
42*	Implicit Shift release

Standard Up Arrow scan codes

72	Num 8 (Up Arrow) press
72*	Num 8 (Up Arrow) release

*With the high-order bit set.

FIGURE 3: Shown here are the scan codes generated by pressing the extended Up Arrow key and the standard Up Arrow key with Num-Lock enabled.

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Also in the .INF file is a section for the desired registry entries called ZDKeyMap.AddReg. The registry entries consist of uninstall information, the GUID, the shell extension information, and the static VxD load information. A section called Strings at the bottom of the .INF file is used to substitute common

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THE VxD

ZDKeyMap uses a statically loaded VxD in conjunction with the virtual keyboard device service VKD_Filter_Keyboard_Input. The VxD is loaded during the Windows 95 boot process. Though Windows 95 supports dynamic loading of VxDs that work like DLLs, that technique would not work without a process to load it. This utility does not have such a process, because it is part of the Windows shell.

The VxD is written in both C and assembly language. The assembly language portion is needed to hook the virtual keyboard driver. With the Windows 95 SDK, Microsoft has made C programming much easier in VxD-land by providing what it calls "wrappers" for VxD services. These wrappers provide the glue we need to call VxD services from the C language. Unfortunately, Microsoft did not provide us with wrappers for all the services, just the more popular ones. You can avoid assembly language programming altogether by using a product called VtoolsD, from Vireo Software (www.vireo.com). An excellent reference is *Systems Programming for Windows 95* by Walter Oney (Microsoft Press, 1996). This book covers VxD programming with and without VtoolsD and C++.

A VxD must have a dispatch table where Windows can call into your code. For this driver, I chose to handle three system messages: Device_Init, Init_Complete, and W32_DeviceIoControl. Device_Init is called when the VxD is loaded during Windows initialization. Init_Complete is called during the final stages of your VxD's initialization (I had to use Init_Complete instead of Device_Init to hook the virtual keyboard driver because of a problem with one of the accessibility drivers in Windows). W32_DeviceIoControl provides a communication path between the property page DLL and VxD. Here is how the dispatch table was defined in the assembly language code:

```
Begin_Control_Dispatch VKEYMAP
    Control_Dispatch Device_Init,
    _OnDeviceInit, cCall, <ebx, edx>
    Control_Dispatch Init_Complete,
    _OnInitComplete, cCall, <ebx, edx>
    Control_Dispatch W32_DeviceIoControl,
    _OnDeviceIoControl, cCall, <esi>
End_Control_Dispatch VKEYMAP
```

You can see where each system message calls out the C language routines: OnDeviceInit, OnInitComplete, and OnDeviceIoControl. Within OnDeviceInit the system Registry is queried for the KeyMappings structure that the property page DLL had saved previously. The services used to access the Registry for a VxD are much the same as with a DLL. First, the Registry key is opened with _RegOpenKey. Then, the KeyMappings array is read in with _RegQueryValueEx:

```
dwSize = sizeof(KeyMappings);
_RegQueryValueEx (hKey, "KeyMappings",
0, 0, KeyMappings, &dwSize);
```

And finally, the key is closed.

The C routine OnInitComplete calls an assembly language wrapper (HookKeyboard) to hook the virtual keyboard driver. The service ordinal for VKD_Filter_Keyboard_Input is put in eax and the address of our KeyboardFilter procedure is placed in esi. Then, the Virtual Machine Manager (VMM) service, Hook_Device_Service, is called to enable the keyboard filter. The address of the old service is saved after the call.

Now, when you press a key, the assembly language routine KeyboardFilter is called. KeyboardFilter calls the C routine C_KeyboardFilter, where the actual key mapping takes place. The heart of C_KeyboardFilter is this:

```
KeyUpFlag = ucScanCode & 0x80;
ulScanCode = KeyMappings[ucScanCode &
```

```
0x7F];
ulScanCode |= KeyUpFlag;
```

where ucScanCode is passed in from KeyboardFilter and ulScanCode is returned. Notice how the high-order bit is masked from ucScanCode so that both a key press and release will be mapped. The scan code is used to index into the KeyMappings array for the new mapping.

As I mentioned earlier, the property page gives the VxD new mappings by calling the Win32 API function DeviceIoControl. This call ends up in our VxD as OnDeviceIoControl. Within that routine is a switch statement that handles a privately defined I/O control called IOCTL_NEW_MAPPINGS. The code below first checks the buffer's size and then copies it to the global array KeyMappings:

```
case IOCTL_NEW_MAPPINGS:
{
    if (pDI0->cbInBuffer !=
        sizeof(KeyMappings))
        return ERROR_BAD_LENGTH;

    memcpy (KeyMappings, (char *)pDI0->
        lpvInBuffer, sizeof(KeyMappings));

    break;
}
```

ZDKeyMap illustrates a number of useful programming techniques and offers a useful tool for those with special keyboard needs. Its neat integration with the Windows shell makes it simple to use. □

Zan Oliphant is president of Zan Software, the author of Programming Netscape Plug-ins (Sams.net Publishing), and a frequent contributor to PC Magazine. He can be reached by e-mail at zan@gate.net.

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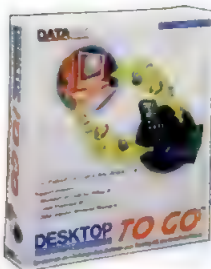
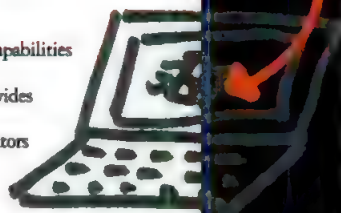
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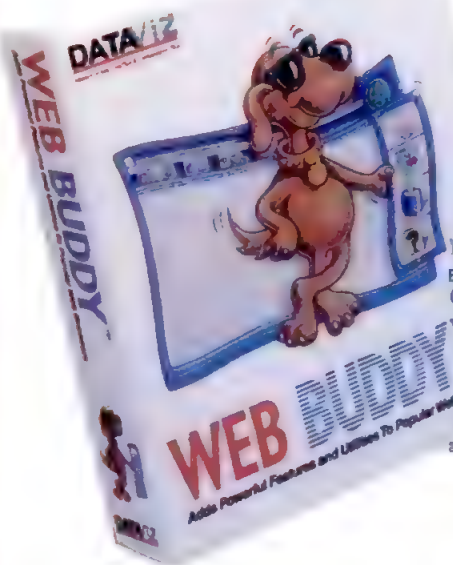
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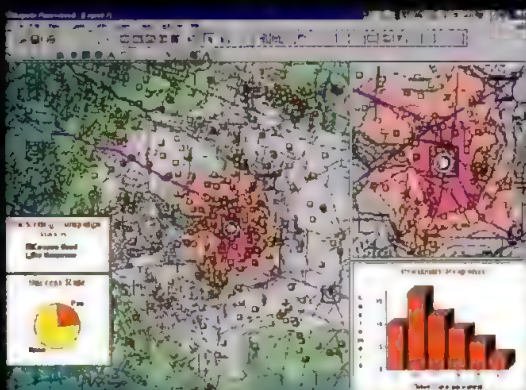


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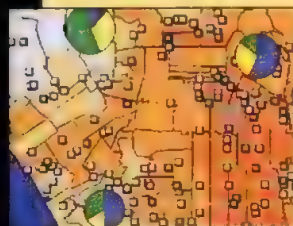
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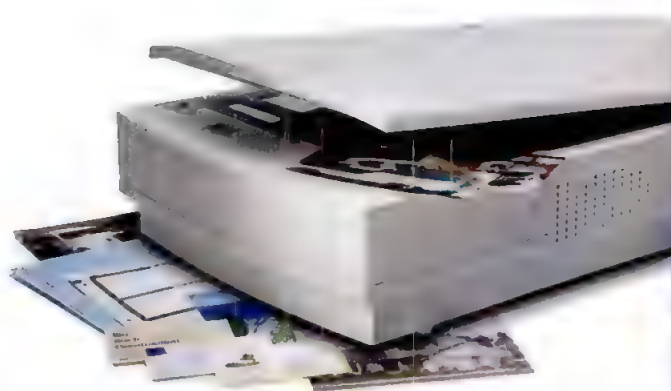


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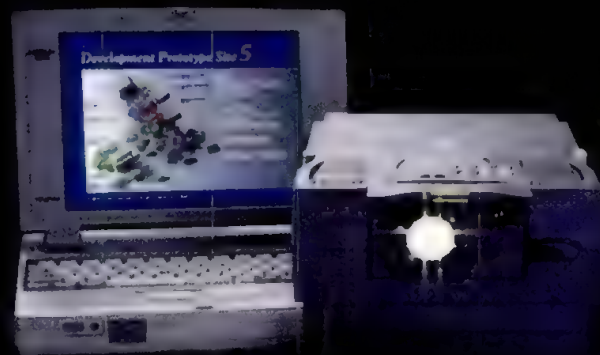
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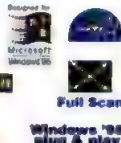
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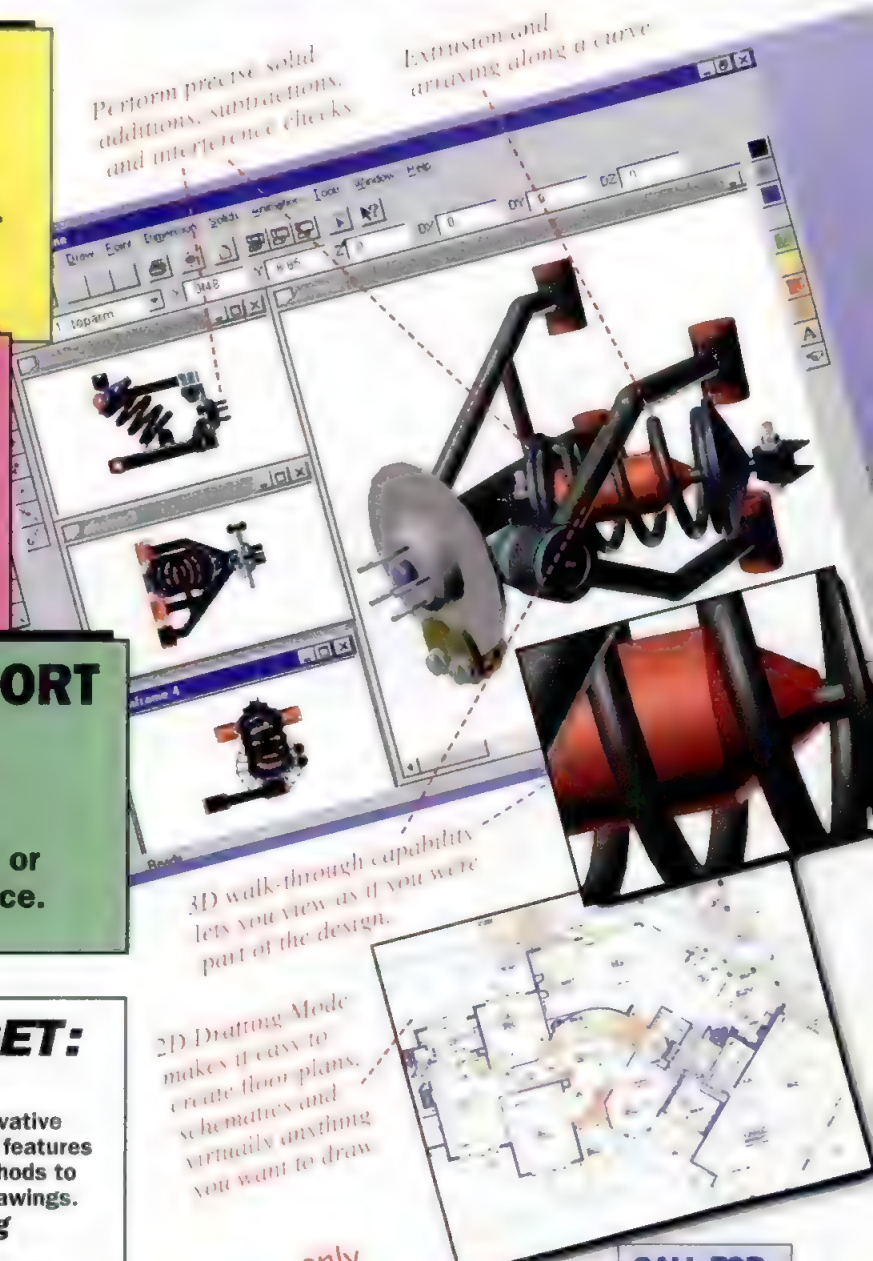
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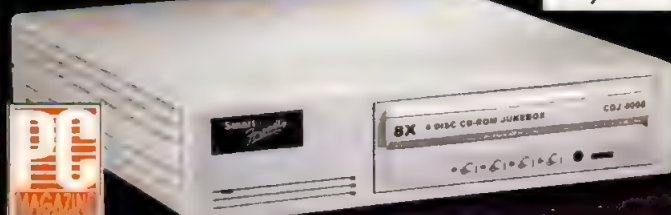
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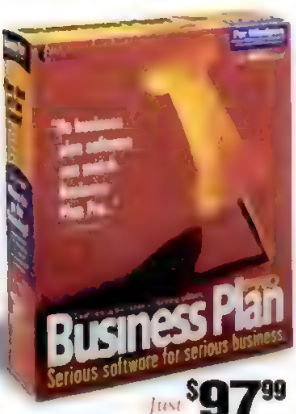
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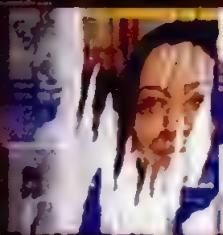
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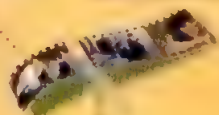
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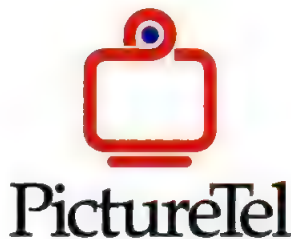
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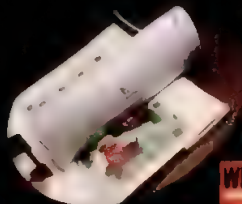
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User-to-User

By Neil J. Rubenking

Old Ways Are Best for Copying Directory Structure

I needed to make a copy of a directory structure—the directories only, without any of the filenames. I immediately thought of the XCOPY command and tried several variations. For example, I first tried

```
XCOPY c:\path\*. * d:\path /s/e
```

to copy all subdirectories (/s), including those that were empty (/e), from the source to the destination. Unfortunately, XCOPY interpreted this as a command to copy all files in the directories. My other attempts were also unsuccessful.

I finally discovered that I could accomplish my goal by passing XCOPY a nonexistent filename. For example, I can use

```
XCOPY c:\path\xxx.xxx d:\path /s/e
```

where the filename xxx.xxx is known not to exist. Dutifully, XCOPY copies the directory structure and tries to copy only files named xxx.xxx (which do not exist) to the destination directory. Interestingly, the /e parameter appears to be essential, in that XCOPY will not create an empty destination subdirectory without it.

Perhaps a tip that involves an old DOS command won't seem too valuable, but I don't know any way to perform this task easily with File Manager or Explorer. If you need to copy a large directory structure, this technique could save a lot of time.

ERIC ROBINSON
Ashburn, Virginia

PC MAGAZINE: Longtime readers of this column will remember this technique; we've discussed it here before. But many newer

computer users won't be familiar with the method, and it's just as useful as ever. As the reader notes, there's no simple way to copy a directory structure without files using Windows' file management utilities.

According to the built-in help for DOS 7's

XCOPY, the /S switch copies directories and subdirectories "except empty ones," and the /E switch does the same but "including empty ones." From XCOPY's point of view, a directory is empty if it does not contain any files matching the file specification you've passed. Thus, if you pass the file specification xxx.xxx, any directory that does not contain a file with this name will be considered empty. That's why it's necessary to use the /E switch when you want just a copy of the directory structure.

Full-Size Taskbar Buttons

Some people complain that the Taskbar is too conservative about allocating space for application buttons. For example, a minimized Microsoft Word on the Taskbar might show only "Microsoft W...", which isn't too descriptive of the document currently being edited.

Here's a quick solution if you don't mind adjusting to a few changes. First, set the Taskbar to Auto Hide. Then drag the Taskbar to either the left or the right side of your desktop so that it hides on one side or the other. Finally, resize the Taskbar so it fills about half your screen, which is just about its maximum size. That's it! Now you have Taskbar buttons that reach across the screen, stacked on top of one another. No more second-guessing a document's filename—unless the pathname is a mile long.

MARCO ROXAS
via the Internet

PC MAGAZINE: As Figure 1 shows, if you open a large number of programs at once, the Taskbar button titles degrade to the point of total uselessness. This is true both in Windows 95 and in Windows NT 4.0. Figure 2 shows the same set of programs after switching to an ultrawide Taskbar—all of the application names are perfectly legible. You'll



FIGURE 1: If you have a large number of applications open, their buttons on the Windows Taskbar may not show any useful information.

probably want to dock at the left side of the screen rather than the right, however—otherwise, you'll frequently find the Taskbar flying out when all you wanted to do was

HIGHLIGHTS



OPERATING SYSTEMS How to enable or disable Advanced Power Management through the Control Panel System applet. *Page 291*



WORD PROCESSING There's no reason to be intimidated by fields in Word. You don't necessarily have to know anything about them in order to use them. *Page 291*



DATABASES Some tricks you should know about if you're attempting to sort dates by month and day in Lotus Approach. *Page 300*

OUR ADVISORS

Douglas Boling is a contributing editor and the author of many PC Magazine utilities.

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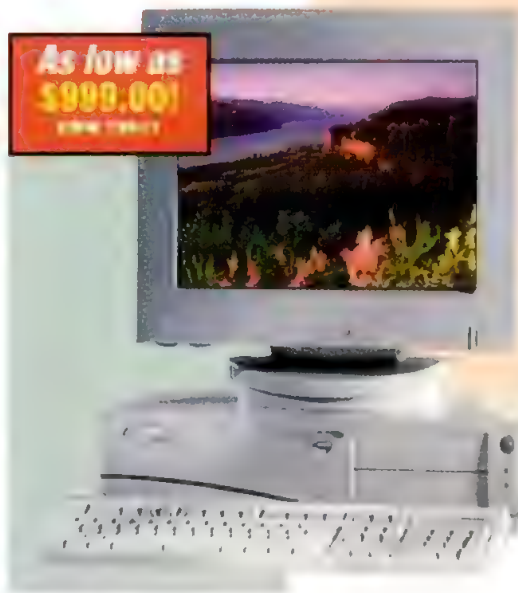
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5133/1200	133MHz Pentium	16MB	1.2GB	\$1169.00	72608
5133/2500	133MHz Pentium	16MB	2.5GB	\$1299.00	72613
5166/1200	166MHz Pentium	16MB	1.2GB	\$1369.00	72610
5166/2500	166MHz Pentium	16MB	2.5GB	\$1499.00	72614
5200/2500	200MHz Pentium	32MB	2.5GB	\$1999.00	72755
6180/1200/CD	180MHz Pentium Pro	16MB	1.2GB	\$1899.00	72756
6180/2500/CD	180MHz Pentium Pro	32MB	2.5GB	\$2229.00	84263
6200/2500/CD	200MHz Pentium Pro	16MB	2.5GB	\$2379.00	72762
Mini-tower	CPU	RAM	Hard drive	Price	CDW
5133/2500/CD	133MHz Pentium	16MB	2.5GB	\$1519.00	72763
5166/2500/CD	166MHz Pentium	32MB	2.5GB	\$1899.00	72764
6200/2500/CD	200MHz Pentium Pro	32MB	2.5GB	\$2579.00	72765



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5133/1620	133MHz Pentium	16MB	1.62GB	\$1369.00	72768
5166/1620	166MHz Pentium	16MB	1.62GB	\$1579.00	72770
5166/2500/LS	166MHz Pentium	16MB	2.5GB	\$1769.00	72771
5200/2500/LS	200MHz Pentium	32MB	2.5GB	\$2339.00	84264
6180/1620/CDS	180MHz Pentium Pro	32MB	1.62GB	\$2299.00	72778
6180/2500/CDS/LS	180MHz Pentium Pro	32MB	2.5GB	\$2499.00	84265
6200/2500/LS/CDS	200MHz Pentium Pro	32MB	2.5GB	\$2719.00	72779
Mini-tower	CPU	RAM	Hard drive	Price	CDW
5133/1620/LS	133MHz Pentium	32MB	1.62GB	\$1699.00	72780
5166/2500/CDS	166MHz Pentium	32MB	2.5GB	\$2099.00	72781



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525MCx	133MHz Pentium	16MB	1.2GB	8X	\$1727.61	76405
525CD	166MHz Pentium	16MB	1.6GB	8X	\$1849.58	76406
525MCx	166MHz Pentium	16MB	1.6GB	8X	\$1989.16	77135
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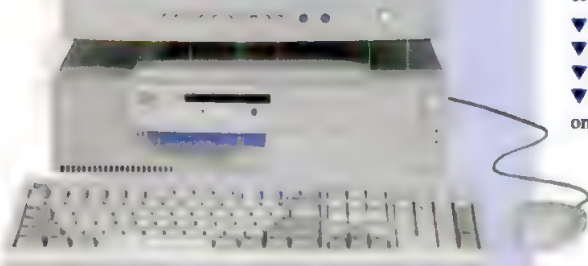
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Tecra 510CDT

Tecra 500CS and 500CDT

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SVGA color display

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Portege 650CT

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365XD	120MHz Pentium	8MB	1.08GB	6X	10.4" active matrix	\$2197.19	81183
365X	133MHz Pentium	24MB	1.08GB	Optional	11.3" dual scan	\$2199.00	81181
365XD	133MHz Pentium	8MB	1.35GB	6X	11.3" dual scan	\$2194.19	81181
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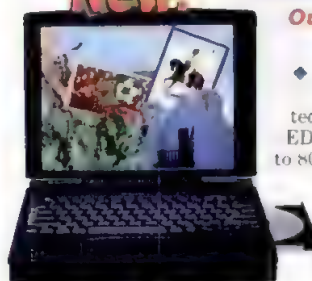
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4130T	133MHz Pentium	16MB	1.08GB	11.6" active matrix	\$2999.00	71116
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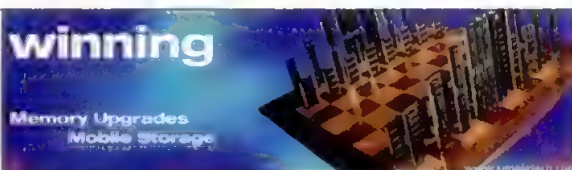
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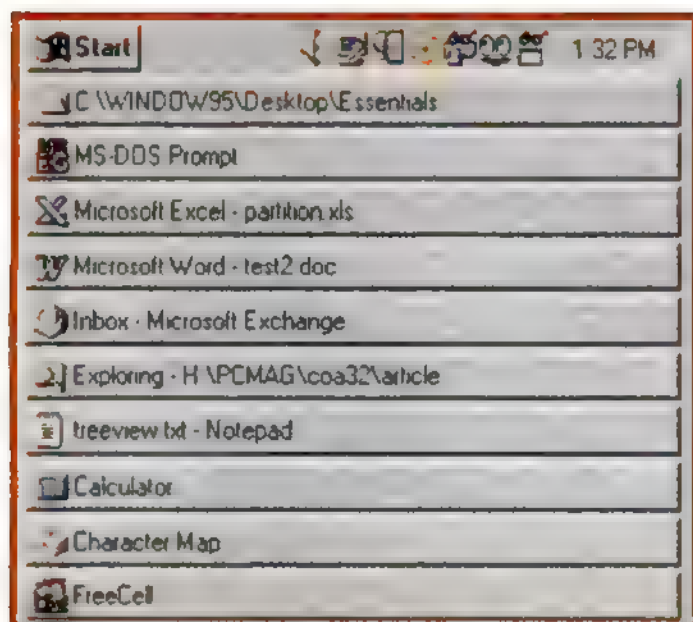


FIGURE 2: By dragging the Taskbar to one side of the screen, you can view the entire text associated with each button.

scroll a maximized window up or down.

Start by right-clicking the Taskbar and selecting Properties from the resulting context menu. On the Taskbar Options page of the dialog, put a check next to Always on Top and Auto Hide, then click OK. Now click on the Taskbar (not on a button) and drag it to the right or left side of the screen.

The Windows Plus! pack has an option that affects the way the hidden Taskbar comes into view. If you have the Plus! pack installed and its "Show window contents while dragging" option enabled, the Taskbar will slide smoothly into view when the mouse reaches the edge at which it's docked. If not, the Taskbar will blink into view all at once. This difference is much more evident when the Taskbar has been modified as suggested here.

The Ultimate Batch File Windows Detector?

PC MAGAZINE: The January 7, 1997, column included a tip from Gary B. Gordon about using a simple IF test to detect whether a batch file is running under Windows. Quite a few readers wrote in to say it simply did not work on their systems. Upon retesting, I found it did not work on my system. Yet at the time I responded to Mr. Gordon's letter, it did work—what could have changed?

It turns out that at the time, I was running Windows 3.x under DOS 7.0, in accordance with another tip from this column. I observed that DOS 7.0 permits the reporting of the values of environment variables with lowercase names, whether or not Windows 95 is running. Thus, it's possible to detect the presence of the `windir` environment variable using the statement

```
IF NOT '%windir%'==' ' echo Windows
```

Even if the `windir` variable was created by Windows 3.x, under DOS 7.0 this test will show that Windows is running. But under any DOS version before 7.0, the test always indicates

that Windows is not running. Now that I've returned to running Windows 3.x under DOS 6.22, the test fails for me as well.

If the one-line test fails, it's possible that Windows 3.x is running under a DOS version before 7.0, so a further test is necessary. It's still worthwhile to keep both tests, as the old-fashioned test for Windows is slower and requires several temporary files. Figure 3 shows `DETECTOS.BAT`, a batch file whose purpose is to determine which operating system is running. It's effectively a hybrid of the new and old techniques, rewritten to make it easier to understand.

If Windows NT is active, `DETECTOS.BAT` sets the environment variable `OS` to the value `Windows_NT`, and the job is done. If Windows NT is not the OS, the batch file continues. It sets the environment variable `VWD` to `Y` if the environment variable `windir` is present, and to `n` otherwise. The batch file sets the environment variable `VWD` to `Y` if the environment variable `winbootdir` is present, and to `n` otherwise. If either of these variables is set to `Y`, it

means DOS 7.0 is running, and there's no need for the old-style test. If both variables are set to `n`, we test for Windows 3.x using a technique explained in the March 26, 1996, User-to-User column.

`DETECTOS.BAT` now sets the value of the `OS` variable depending on whether the values of the `VWD` and `VBD` variables are `Y` or `n`. If both are `n`, the operating system is a DOS version before 7.0. If just `VBD` is `Y`, the OS is DOS 7.0. If just `VWD` is `Y`, the OS is Windows 3.x. And if both variables are `Y`, the OS is either Windows 95 or Windows 3.x running under DOS 7.0.

There's no perfect way to determine which version of Windows is running under DOS 7.0, but if it's Windows 95, the `windir` and `winbootdir` variables will usually have the same value, and if it's Windows 3.x, they will usually be different. If the two variables are different, `DETECTOS.BAT` notes the possibility that Windows 3.x is running under DOS 7.0. This may be the last word on detecting whether a batch file is running under Windows!

```
@ECHO OFF
:: Windows NT sets the OS variable to "Windows_NT"
IF '%OS%'=='Windows_NT' GOTO Done

SET OS=
SET WINDIR=
SET WINBOOTDIR=
SET VWD=n
SET VBD=n

IF NOT '%windir%'==' ' SET VWD=Y
IF NOT '%winbootdir%'==' ' SET VBD=Y
IF NOT '%VWD%%VBD%'=='nn' GOTO Not31

:: Distinguish DOS-pre-7 from Windows 3.x by seeking
:: "windir=" in the output of the SET command.
ECHO SET VWD=n>0.BAT
ECHO SET VWD=Y>1.BAT
SET | FIND /C "windir=" > DETECT$$
CALL DETECT$.BAT
FOR %%v IN (0 1 DETECT$$) DO DEL %%v.BAT

:Not31
IF '%VWD%%VBD%'=='nn' SET OS=DOS_pre_7
IF '%VWD%%VBD%'=='nY' SET OS=DOS_7
IF '%VWD%%VBD%'=='Yn' SET OS=Windows_3.x
IF '%VWD%%VBD%'=='YY' SET OS=Windows_95

:Done
ECHO Operating system is %OS%

:: If you NEVER run Windows 3.x under DOS 7, you can
:: delete this comment and the next two lines.
IF NOT '%windir%'=='%winbootdir%' SET VBD=%VBD%n
IF '%VWD%%VBD%'=='YYn' ECHO (or Windows 3.x under DOS 7)

:: Clean up environment variables
FOR %%v IN (VWD VBD) DO SET %%v=
```

FIGURE 3: This batch file determines which of several operating systems you are running.





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IDE Optical Drives - Includes 1 Free Cartridge!

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SCSI**SCSI Frame**

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SCSI Hard Drives

2GB	#SSS2.0HDS	\$429
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9GB	#SSS9.0HDS	\$1959

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2-4GB 4mm DDS-1	#SSS2-4TDS	\$829
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12-24GB 4mm DDS-3	#SSS12-24TDS	\$1399

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640MB	#SSS640MOS	\$629

SCSI Removable Cartridge Drives - Incl. 1 Free Cartridge!

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1GB Iomega Jaz™	#SSS1.0RMS	\$509

Wide SCSI**Wide SCSI Frame**

5 1/4" Receiving Frame	#SSSDIFW	\$89
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Wide SCSI Hard Drives

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Astarte Toast CD-ROM Pro	\$85
-Supports Macintosh (TOAST)	
Elektron Gear Multimedia for PC	\$69
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-Also supports Macintosh (GEAR)	
Creative Digital Research CDR HYCD for PC	\$379
-Supports Windows 3.1, 95, NT	
-Creates hybrid CDs for PC/Mac/Unix (CDHYWIN)	

4 - CHOOSE YOUR SCSI CONTROLLER

16Bit ISA PIO Adapter (A1505CDKIT)	\$50
16Bit ISA Bus Master Advansys (ABP5140)	\$95
32Bit PCI Bus Master Advansys (ABP940)	\$125
32Bit PCI PIO Adapter (A2920KIT)	\$159
32Bit PCI Bus Master Adapter (A2930KIT)	\$189

4 - CHOOSE YOUR QUANTITY OF BLANK MEDIA

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• IDE HARD DRIVES •

IDE	Speed	RPM	Brand	Model	Wty	Price
1200MB	10ms	5400	Fujitsu	M1636T	3	\$189
1200MB	14ms	4103	JTS	JTS1200	3	\$179
1275MB	12ms	4500	Seagate	ST31276A	3	\$195
1280MB	11ms	4500	Quantum	TM31280A	3	\$192
1281MB	11ms	5200	Western Digital	WDAC11200	3	\$199
1624MB	10ms	5200	Western Digital	WDAC12600	3	\$209
1670MB	11ms	4480	Maxtor	M81750A	3	\$210
1700MB	10ms	4400	Fujitsu	M1632T	3	\$194
1700MB	12ms	4500	Seagate	ST31720A	3	\$205
2000MB	14ms	4103	JTS	JTS2000	3	\$219
2100MB	9ms	5400	Fujitsu	M1624T	3	\$224
2111MB	12ms	5200	Western Digital	WDAC21100	3	\$229
2132MB	12.5ms	4500	Seagate	ST32132A	3	\$229
2151MB	10ms	5400	Quantum	FB32160A	3	\$259
2168MB	10.5ms	4500	Quantum	TM32160A	3	\$235
2187MB	12ms	4480	Maxtor	M82187A	3	\$239
2300MB	9ms	5400	Fujitsu	M1638T	3	\$229
2550MB	15ms	3600	Quantum	BF2550A	3	\$225
2550MB	10.5ms	4500	Quantum	TM32550A	3	\$249
2559MB	11ms	5200	Western Digital	WDAC32500	3	\$255
2560MB	11ms	5400	Seagate	ST32560A	3	\$249
2560MB	10ms	5400	Maxtor	M82560A	3	\$259
3166MB	12ms	5200	Western Digital	WDAC31100	3	\$295
3228MB	10ms	5400	Quantum	FB32240A	3	\$309
3245MB	12ms	4500	Seagate	ST33240A	3	\$315
3254MB	10.5ms	4500	Quantum	TM33200A	3	\$315
3500MB	12ms	4480	Maxtor	M83500A	3	\$319
3840MB	10.5ms	4500	Quantum	TM33840A	3	\$325
4000MB	12ms	5200	Western Digital	WDAC4000	3	\$375
4310MB	10ms	5400	Quantum	FB34320A	3	\$375
4326MB	12ms	4500	Seagate	ST34340A	3	\$341
4335MB	14ms	3600	Quantum	BF4335A	3	\$294
5120MB	10ms	5400	Maxtor	M85120A	3	\$449
6448MB	10ms	5400	Quantum	FB6480A	3	\$539
6510MB	14ms	3600	Quantum	BF6510A	3	\$439

• SCSI HARD DRIVES •

SCSI	Speed	RPM	Brand	Model	Wty	Int	Ext
1050MB	9ms	5400	Seagate	ST31055N	3	\$299	\$369
1280MB	12ms	4500	Quantum	TM31280S	3	\$269	\$339
2110MB	10.5ms	4500	Quantum	TM32110S	3	\$309	\$379
2150MB	9ms	5400	Seagate	ST32155N	3	\$475	\$545
2150MB	8ms	7200	Seagate	ST32171N	3	\$649	\$719
2151MB	10ms	5400	Quantum	FB32160S	3	\$339	\$409
3228MB	10ms	5400	Quantum	FB32240S	3	\$389	\$459
3254MB	10.5ms	4500	Quantum	TM33200S	3	\$355	\$425
4100MB	7.5ms	7200	Micropolis	MC3431	3	\$739	\$809
4310MB	10ms	5400	Quantum	FB34320S	3	\$479	\$549
4350MB	8ms	7200	Seagate	ST34371N	3	\$989	\$1059
4400MB	8ms	7200	Fujitsu	M2954S	3	\$799	\$869
4550MB	8ms	7200	Quantum	XP34550S	3	\$879	\$949
4550MB	7.5ms	7200	Micropolis	MC4345	3	\$825	\$895
4550MB	7.5ms	7200	Micropolis	MC4345AV	3	\$909	\$979
6448MB	10ms	5400	Quantum	FB36480S	3	\$399	\$669
9091MB	6.5ms	7200	Micropolis	MC3391	3	\$1345	\$1415
9091MB	6.5ms	7200	Micropolis	MC3391AV	3	\$1455	\$1525
9100MB	9ms	7200	Seagate	ST39171N	3	\$1869	\$1939
9100MB	8ms	7200	Quantum	XP39100S	3	\$1399	\$1469
9100MB	10ms	7200	Fujitsu	M2949S	3	\$1439	\$1509
23.3GB	13ms	5400	Seagate	ST423451N	3	\$2895	\$3085

WIDE SCSI

1050MB	9ms	5400	Seagate	ST31055W	3	\$369	\$499
2150MB	9ms	5400	Seagate	ST32155W	3	\$499	\$629
2150MB	8ms	7200	Seagate	ST32171W	3	\$679	\$819
4294MB	8ms	7200	Micropolis	MC3243W	3	\$799	\$929
4294MB	8ms	7200	Micropolis	MC3243WAV	3	\$829	\$959
4350MB	8ms	7200	Seagate	ST34371W	3	\$1039	\$1169
4400MB	8ms	7200	Fujitsu	M2954W	3	\$849	\$979
4550MB	7.5ms	7200	Micropolis	MC4345W	3	\$875	\$1005
4550MB	7.5ms	7200	Micropolis	MC4345WAV	3	\$950	\$1080
4550MB	7.5ms	10,000	Seagate	ST34501W	3	\$7199	\$1529
4550MB	8ms	7200	Quantum	XP34550W	3	\$889	\$1069
9091MB	6.5ms	7200	Micropolis	MC3391W	3	\$1485	\$1585
9091MB	6.5ms	7200	Micropolis	MC3391WAV	3	\$1569	\$1669
9100MB	8ms	7200	Quantum	XP39100W	3	\$1599	\$1739
9100MB	8ms	7200	Fujitsu	M2949W	3	\$1559	\$1689
9100MB	8ms	7200	Seagate	ST39171W	3	\$2149	\$2289
9100MB	8ms	10,000	Seagate	ST39101W	3	\$3599	\$3739
23.3GB	13ms	5400	Seagate	ST423451W	3	\$3899	\$4099

• CD ROM DRIVES •

SCSI	Brand	Spin	Model	Speed	Int	Ext
Plextor	12X	PX12TS	105ms	\$265	\$355	
Plextor	12X	PX12CS	105ms	\$309	\$399	
Toshiba	12X	XM5701B	115ms	\$169	\$259	
Toshiba	15X	XM3801B	99ms	\$259	\$349	
NEC	16X	CDR1610	100ms	\$199	\$289	
ATAPI IDE	Brand	Spin	Model	Speed	Int	Ext
Mitsumi	8X	CRIMCFX800	150ms	\$109	\$139	
Lite On	12X	LTN126A	155ms	\$115	\$145	
Acer	12X	AC612A	125ms	\$119	\$149	
Toshiba	12X	XM5702B	115ms	\$145	\$175	
Mitsumi	12X	CRIMCFX12X	150ms	\$125	\$155	
Lite On	16X	LTN262A	120ms	\$145	\$175	
Mitsumi	16X	CRIMCFX16X	120ms	\$155	\$185	
Acer	16X	AC706A	120ms	\$155	\$185	
NEC	16X	CDR1600	100ms	\$165	\$195	
Acer	18X	AC616A	120ms	\$160	\$190	

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Ask Our Advisors

HARDWARE

Turn Your Radio Down!



For some reason, the speakers attached to my computer have started picking up a local A.M. radio station. When I touch the right speaker (the one with the power), the radio signal increases dramatically. Can you tell me why is this happening and how I can fix it?

GUILLERMO A. SANCHEZ
Eagle Pass, Texas

PC MAGAZINE: The most likely cause is improper grounding somewhere along the line. This could be in the computer's electrical connection or in the speaker wires.

Start by checking the electrical ground. Your computer should be plugged into a three-prong outlet; if you're using a three-to-two-prong adapter, make sure that the grounding wire is connected to the outlet box. You can get a plug tester at Radio Shack or at most hardware stores. The diagnostic lights will tell you whether or not you have proper grounding at the outlet.

If the electrical grounding is okay, check the sound cables. Self-powered speakers have built-in amplifiers, so any interference being picked up in the signal wire is amplified before being sent to the speakers. Make sure that the cables used to connect the speakers and the sound card are of good quality and that the connectors provide solid connections on both the ground and signal wires. A continuity tester or ohmmeter can help you test the cable connections. Finally, make sure that the plugs sit properly in their jacks and make solid contact with the connectors.

If you're still unable to identify the source of the problem, you may be able to reduce the effect by rerouting the cables, replacing them with better-quality wires, or looping each cable through a ferrite ring.—*Alfred Poor*

OPERATING ENVIRONMENTS

Pros and Cons of Advanced Power Management



I wanted to follow the suggestion in your User-to-User item "Shut Down Windows 95 to DOS" (September 10, 1996), but when I select Shut Down from the Start menu, Windows 95 exits and then physically turns off the PC. This automatic power-down feature makes the ability to shut down to DOS completely useless.

I am told that this automatic shut-off results from interaction between Windows 95 and a Plug and Play BIOS. I disabled the power-saving features in my BIOS, but my computer still gets turned off. Is there any way to disable this feature?

ANTHONY MEYER
Bowling Green, Ohio

My motherboard supports Advanced Power Management, and my monitor (a Nokia 447L) is Energy Star-compliant. How can I enable this "green" function under Windows 95? For my laptop, I can use the Power Icon in Control Panel. How can I add this icon for my desktop without reinstalling Windows 95 in laptop installation mode?

XIN FENG
Davis, California

PC MAGAZINE: According to Microsoft's knowledge base, shutting down the system upon exit is an intrinsic feature of APM (Ad-

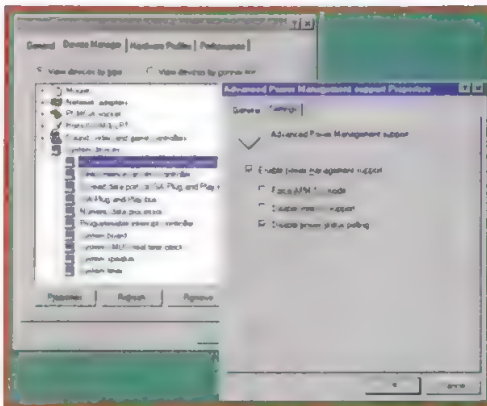


FIGURE 1: If Advanced Power Management is available to your system, you can enable or disable it through the Control Panel System applet.

vanced Power Management). Microsoft says this occurs on computers with a Plug and Play BIOS that supports APM features. If you have APM features enabled, your computer is supposed to shut down when you exit Windows 95. In other words, that's not a bug, it's a feature!

If you're willing to give up APM to gain the ability to exit from Windows 95 to DOS, try this: Open the System applet in Control Panel and click on the Device Manager tab. Expand the System devices item in the device tree and double-click Advanced Power Management. Click the Settings tab and remove the check mark next to "Enable power management support" (Figure 1). This should do the trick.

Conversely, for readers who want the APM features activated and aren't seeing them, use the same technique in reverse. That is, open

the Advanced Power Management properties page and put a check mark next to "Enable power management support." Press OK, then press OK again, and confirm that Windows can restart now. After doing this, you should have a Power applet in your Control Panel that you can use like the one on your laptop.

Of course, if you don't find an Advanced Power Management entry under System devices, it means Windows 95 doesn't recognize that your system supports APM; in that case, there's little you can do.—*Neil J. Rubenking*

WORD PROCESSING

Date and Page Numbering in Word



Our scientific research organization, Biosystems Research Institute, is in the process of adopting Microsoft Word for Windows. We need some essential features that we've been unable to find in Word, even with help from Microsoft's technical support. We hope you can help us with two in particular.

The first issue is date format. The format we prefer is "day month year," as in 16 February 1997. Word offers a similar format in its Date and Time dialog box, but the Word version includes a comma, so it reads 16 February, 1997. Is there a way to eliminate the comma when entering the date from the dialog box, or some alternate way to enter a date?

The second issue is page numbering. One of the most common formats for numbering pages takes the form Page X of Y, where X is the current page and Y is the total number of pages in the document. Is there a way to do this in Word?

ELIE SHNEOUR
San Diego, California

PC MAGAZINE: Both of these formats are actually easy to produce in Word, but you need to use fields, which are probably the last feature in Word that most people learn about. Fields are codes that tell Word to fill in some information. In many cases, you don't have to know anything about fields to use them. For example, when you give the Insert | Date and Time command to open the Date and Time dialog box, you'll see a check box at the bottom of the dialog box labeled Insert as Field in Word 6 or Update Automatically (Insert as Field) in Word 7.

If you check this box, you'll find that you can easily update the date at any time by moving the cursor or selection to the date and hitting F9 to update the fields. You'll also find that you can use Alt-F9 to toggle between seeing the field result and the field itself, which will take the form: { \@ "DATE FORMAT" },

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760XL	166MHz MMX	12.1" Active	16MB/2.1GB	Opt.	CALL
760XD	166MHz MMX	12.1" Active	32MB/3.0GB	8X	CALL

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Model	CPU	Screen	RAM/HD	Opt.	Price
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365XD	120MHz	10.4" Active	8MB/1.1GB	6X	2099
365XD	133MHz	11.3" Active	8MB/1.4GB	6X	2699

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520T	120MHz	11.3" Active	8/810MB	6X	2499
530T	133MHz	11.3" Active	16MB/1.3GB	6X	2999*
555Tx	150MHz MMX	12.1" Active	16MB/2.0GB	10X	3999†

* Includes built-in 28.8 fax/modem

† Includes 33.6 fax/modem



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LifeBook™ 420D
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- Only 1.2" thick and 4.2 lbs.
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Model	CPU	Screen	RAM/HD	Opt.	Price
635T	133MHz	12.1" Active	16MB/1.3GB	Opt.	\$3999
655Tx	150MHz MMX	12.1" Active	16MB/1.3GB	Opt.	4299

LifeBook™ 635T
\$3999
3-Year TAP Warranty... \$99.97
5-Year TAP Warranty... \$499.97



LifeBook™ 600 Notebook
Additional models available with 33.6 fax/modem and Windows 95

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- Up to Pentium 120MHz processors
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- 11.3" Dual Scan & Active Matrix displays
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Satellite Pro 430

Model	CPU	Screen	RAM/HD	Opt.	Price
420CDS	100MHz	11.3" Dual Scan	8/772MB	6X	\$1679
430CDS	120MHz	11.3" Dual Scan	16MB/1.2GB	10X	1969
420CDT	100MHz	11.3" Active	8MB/1.2GB	6X	2449
430CDT	120MHz	11.3" Active	16MB/1.2GB	10X	2629

Satellite Pro 420CDS
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3-Year TAP Warranty... \$99.97
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Model	CPU	Screen	RAM/HD	Opt.	Price
500CS	120MHz	12.1" Dual Scan	16MB/1.3GB	Opt.	\$1799
500CDT	120MHz	12.1" Active	16MB/1.3GB	6X	3449
510CDT	133MHz	12.1" Active	16MB/2.1GB	10X	4279

Tecra 500CS
\$1799
3-Year TAP Warranty... \$99.97
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digital™

HiNote VP 500
\$2449
3-Year TAP Warranty... \$299.97
5-Year TAP Warranty... \$349.97

HiNote VP 500

Model	CPU	Screen	RAM/HD	Opt.	Price
VP 560	133MHz	12.1" Dual Scan	16MB/1.4GB	12X	\$2449
VP 565	133MHz	12.1" Active	16MB/1.4GB	12X	3299
VP 575	166MHz MMX	12.1" Active	16MB/2.1GB	12X	4399

Product differs slightly from photo



HiNote VP 500

HiNote Ultra II

- Only 1.2" thick and 4.0 lbs!
- Up to 150MHz Pentium processors
- 11.3" Super VGA, Active Matrix displays
- 16MB of RAM memory

Model	CPU	Screen	RAM/HD	Opt.	Price
Ultra II	133MHz	11.3" Active	16MB/1.35GB	Opt.	\$4499
Ultra II	150MHz	11.3" Active	16MB/1.44G	Opt.	4799*
Ultra II	133MHz	11.3" Active	16MB/1.35GB	Opt.	4699**
Ultra II	150MHz	11.3" Active	16MB/1.44G	Opt.	4799

* Features Win for Workgroups ** Features Win NT

HiNote Ultra II
\$4499
3-Year TAP Warranty... \$99.97
5-Year TAP Warranty... \$599.97

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Win NT 4.0 Models Available



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Presario

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Model	CPU	Screen	RAM/HD	Opt.	Price
5250	120MHz	10.4" Active	16/810MB	Opt.	\$2729
5280	120MHz	11.3" Active	16MB/1.35GB	Opt.	3439
5300	133MHz	12.1" Active	16MB/1.35GB	Opt.	3859
5380	133MHz	12.1" Active	16MB/2.2GB	Opt.	4159
5400	150MHz	12.1" Active	32MB/2.2GB	Opt.	4349

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E133T 133MHz 11.3" Active 16MB/1GB 6X \$1999

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6200MX 166MHz MMX 13.3" Active 32MB/2.1GB 10X \$6399

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Versa 6200



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6050MX	150MHz MMX	12.1" Active	16MB/2.1GB 10X		4699

6050H 150MHz MMX 12.1" Active 16MB/1.4GB 10X \$3999
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Model	CPU	Screen	RAM/HD	CD Drive	Price
A41	120MHz	11.3" Dual Scan	16MB/1.0GB 6X		\$1999
A42	120MHz	12.1" Active	16MB/1.0GB 6X		2499

Ascentia J

Model	CPU	Screen	RAM/HD	CD Drive	Price
J55	133MHz	11.3" Active	16MB/1.0GB Opt.		\$2249

J55 133MHz 11.3" Active 16MB/1.0GB Opt. \$2249

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Ascentia A



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Echos

Model	CPU	Screen	RAM/HD	CD Drive	Price
Echos	100MHz	11.3" Dual Scan	8MB/1.3GB 6X		\$1799
Echos	100MHz	10.4" Active	8MB/1.3GB 6X		2099
Pro	133MHz	12.1" Dual Scan	16MB/1.3GB 8X		2999
Pro	133MHz	12.1" Active	16MB/2GB 8X		3499
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Model	CPU	Screen	RAM/HD	CD Drive	Price
800CS	100MHz	10.0" Dual Scan	16/810MB Opt.		\$2449
800CT	133MHz	10.4" Active	16MB/1.4GB Opt.		3469

HP OmniBook 5500

Model	CPU	Screen	RAM/HD	CD Drive	Price
5500CTS	120MHz	10.4" Active	16MB/1.35GB Opt.		\$2749
5500CTS	133MHz	12.1" Active	16MB/1.35GB Opt.		3279
5500CTS	133MHz	12.1" Active	16MB/2GB Opt.		3549

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Model	CPU	Screen	RAM/HD	CD Drive	Price
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660CDT	166MHz MMX	11.3" Active	16MB/2.1GB 10X		3949

TravelMate 6000

Model	CPU	Screen	RAM/HD	CD Drive	Price
6030	133MHz	12.1" Active	16MB/1.35GB 10X		\$3379
6050	150MHz	12.1" Active	16MB/1.35GB 10X		3699
6160	166MHz MMX	12.1" Active	32MB/1.1GB 10X		4899

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7160	166MHz	16MB/2.1GB	8X	1599
7161	166MHz MMX	32MB/2.4GB	12X	1999
7200	200MHz	16MB/3.0GB	8X	2199
7201	200MHz MMX	32MB/3.0GB	12X	2199

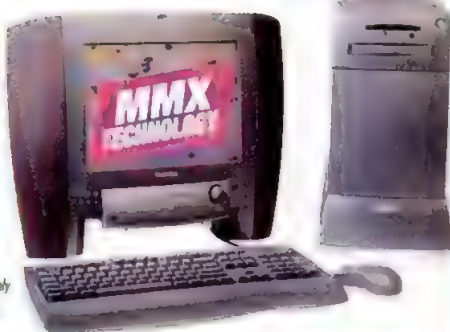
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Model	CPU	RAM/MB	CD-ROM	Price
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4770	200MHz MMX	32MB/3.8GB	16X	2299

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Presario	14"	12.9"	1024 x 768	\$399
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Presario	17"	15.6"	1280 x 1024	749



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CBE	166MHz MMX	32MB/3.2GB	16X	\$2149
C9E	200MHz MMX	32MB/3.2GB	16X	2299
SBC	166MHz MMX	32MB/3.2GB	16X	2349
S9C	200MHz MMX	32MB/4.2GB	16X	2599

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7360	200MHz MMX	32MB/3.8GB	16X	2399

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Model		CPU	RAM/MB	CD-ROM	Price
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Pavilion	17"	15.7"	1024 x 768		749

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9404	200MHz MMX	32MB/2.0GB	16X	2079
9406	200MHz MMX	64MB/4.0GB	16X	2599

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9712	166MHz MMX	32MB/3.2GB	16X	1999
9716	200MHz MMX	32MB/3.2GB	16X	2199

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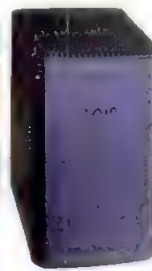


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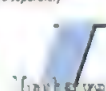
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where DATE FORMAT specifies the format for the date.

The key to getting the format you want is to define the field yourself. You can then store the field in a macro to enter it easily. And since you'll probably most often want to enter a date that doesn't change, you can also include the command for converting the field to text as part of the macro.

To create the macro by recording it, first choose Tools | Macro, enter an appropriate name for the macro, such as Date, then choose Record. Word will open the Record Macro dialog box with options to let you attach the macro to a toolbar button, menu, or keystroke. If you like, you can skip this step and attach the macro to one of these choices later, through the Tools | Customize command.

Next hit Ctrl-F9 to insert the field characters { and }. These look like boldface curly braces, but are actually special characters that Word uses to recognize a field. Then, within these characters type:

```
Time \@ "d MMMM yyyy"
```

Be sure to follow the capitalization of the date format as shown here. A change to a lower-case m, for example, will tell Word to enter the current minute rather than the current month. Note too that you can modify these codes if you like. MM will return the two-digit version for the month, such as 03 for March. MMM will return the three-character abbreviation, such as Mar. M will get you the month digit without zero-padding—for example, 3 for March and 12 for December.

With the cursor still between the two field characters, hit F9, which will update the field, and then Ctrl-Shift-F9, which will convert the field into text. Finally, choose Tools | Macro and then Stop Recording. Then save the macro to disk by choosing File | Save All, and answer Yes if Word asks whether to save the Normal template. You will now be able to insert the current date by running the macro. And don't forget to attach it to a keystroke, menu, or toolbar button so you can run it easily.

If you look at the macro you created—by choosing Tools | Macro, entering the macro name, and choosing Edit—you'll see it consists of just four lines in addition to the required Sub MAIN and End Sub statements.

```
InsertFieldChars
Insert "time \@ " + Chr$(34)
    + "d MMMM yyyy" + Chr$(34)
UpdateFields
UnlinkFields
```

If you prefer to create a macro by typing it rather than recording it, you can type these four lines in a macro-editing window. But you

can get the same result more elegantly by using a single line:

```
InsertDateTime .DateTimePic =
    "d MMMM yyyy". .InsertAsField = 0
```

Setting InsertAsField to 0 in this version tells Word to insert the date as text.

The answer to your page-numbering requirements is to take advantage of two fields that Word already includes in the form you need them. The field for the X in "X of Y pages" is {Page}. The field for the Y is {Numpages}, so the entry would be Page {Page} of {Numpages} pages. To create a macro that inserts both fields plus the surrounding text, simply record the steps as you create the format, using Ctrl-F9 to insert the field characters, typing in the appropriate text, and so on. Here again, for maximum convenience, attach the macro to a keystroke, menu, or toolbar button, and then run it as needed to insert the text and fields into a header or footer.—M. David Stone

SPREADSHEETS

Decimal Degrees and Rounding Errors



I'm trying to come up with an equation to take an angle entered in DD.MMSS format and convert it to decimal degrees in Lotus 1-2-3 for Windows 5.0. What I have so far is the following expression:

```
@INT(A3)+(@INT((A3-
@INT(A3))*100))/60+((A3*100)-
@INT(A3*100))*100/3600
```

for an angle entered in cell A3 in DD.MMSS format.

But I'm running into a rounding problem. An entered angle of 46.1800 (48d 18m 00s) correctly converts to 46.3000 decimal degrees. But an entered angle of 46.1900 also converts to 46.3000 decimal degrees instead of the correct 46.3167 degrees.

The expression seems to work correctly whenever a nonzero value is included for the seconds portion of the angle. For example, while 46.1900 does not convert correctly, 46.1860 (46d 18m 60s) does.

I can get around this error by entering the three parts of an angle in three separate cells, but I prefer to enter the angle in a single cell. Most scientific calculators accept angle input in this fashion, so I'm surprised that 1-2-3 doesn't have an @DMSTODEG function to perform this conversion.

Is there a single formula that will reliably perform this conversion?

JERRY MAHUN
Madison, Wisconsin

PC MAGAZINE: All spreadsheet programs generate rounding errors, and tracking these down can be a real nuisance. You could try to locate the source of your particular error and then use @ROUND to eliminate it. But because rounding errors don't usually plague calculations involving integers, it would be safer to parse the input value into separate integers representing degrees, minutes, and seconds components; do the math on those components; and then add up the results. The following formula isn't pretty, but it works, and it allows you to do all the parsing and calculating without first splitting the input value across three cells:

```
@VALUE(@LEFT(@STRING(A1,4),
@FIND(".",@STRING(A1,4),0)))+
@IF(A1<0,-1,1)*@VALUE(@MID(@STRING
(A1,4),@FIND(".",@STRING(A1,4),0)+
1,2))/60+@IF(A1<0,-1,1)*@VALUE
(@RIGHT(@STRING(A1,4),2))/3600
```

The formula assumes that your input value is in A1; that everything to the left of the decimal point represents degrees; that the first two digits after the decimal point represent minutes; and that the third and fourth digits after the decimal point represent seconds. The formula has three terms joined by plus signs.

The first term

```
@VALUE(@LEFT(@STRING(A1,4),
@FIND(".",@STRING(A1,4),0)))
```

gets the degrees component. @STRING(A1,4) assigns to the number in A1 the fixed format with four decimal places, then converts that number to a label.

```
@FIND(".",@STRING(A1,4))
```

locates the decimal place in the resulting label-information we need because the degree component has an uncertain number of digits and may include a minus sign. The @LEFT function extracts everything up to but not including the decimal point, and the @VALUE function converts the extracted substring back to a number.

The second term

```
@IF(A1<0,-1,1)*@VALUE(@MID(@STRING
(A1,4),@FIND(".",@STRING(A1,4),0)+
1,2))/60
```

gets the minutes component. Here again we use @STRING to convert the input to text and @VALUE to turn extracted text back into a number. This time we use @MID for the extraction, pulling out just the first two characters following the decimal point. Dividing by 60 expresses the minutes as a fractional component of 1 degree, and multiplying

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by the result of this @IF function

@IF(A1<0,-1,1)

makes the minute component negative if the original input value was negative. Note that we did not have to use this multiplier with the degrees component, because the result of the @LEFT function in the first term already includes a minus sign if the input value is negative.

The third component

@IF(A1<0,-1,1)*@VALUE(@RIGHT
(@STRING(A1,4),2))/3600

gets the seconds component. This term works just like the second term, except that we use @RIGHT to pull out the last two digits of the input value, and we divide the result by 3,600 to turn seconds into a degree fraction.

If you're using the latest version of 1-2-3 (1-2-3 97, shipped as part of SmartSuite 97), you can create your own @DMStoDEG function using LotusScript. Here's one way to do it:

```
Function DMStoDEG(dms)
  If dms < 0 Then
    sign = -1
  Else
    sign = 1
  End If
  dmstext = Format(Str$(dms),
    "#.0000")
  decpos = Instr(dmstext, ".")
  degrees = Val(Left$(dmstext, decpos
    - 1))
  minutes = sign * Val(Mid$(dmstext,
    decpos + 1, 2))
  seconds = sign * Val(Right$(
    dmstext, 2))
  DMStoDEG = degrees + minutes/60 +
    seconds/3600
End Function
```

Assuming the input value is known to the function as dms, the statement

dmstext = Format(Str\$(dms), "#.0000")

assigns a formatted text representation of the input to a variable named dmstext. The Instr function in the following line locates the decimal point; the following three lines extract the degrees, minutes, and seconds components; and the final statement does the addition and returns the sum to your worksheet.

Once you've created a custom function like this, you can simply type

@DMStoDEG(36.1900)

and get the decimal equivalent, 36.3167.

For Excel users, the corresponding formula is as follows:

```
=LEFT(A1,FIND(".",TEXT(A1,"#.0000"))
-1) + IF(A1<0,-1,1) * MID(TEXT(A1,
"#.0000"),FIND(".",TEXT(A1,"#.0000"))
+1,2)/60 + RIGHT(TEXT(A1,"#.0000"),
2)/3600
```

And you can create a custom function using exactly the same code as shown for LotusScript, above.

Note that Excel automatically takes care of some of the text-to-number conversions for you, so your formula doesn't need to use the VALUE function. If your input value is already formatted for four digits of precision, you can even eliminate the TEXT functions in the formula. For example, you could write the first term as

```
=LEFT(A1,FIND(".",A1)-1)
```

But because you may not always know how the input value is going to be formatted, it's safer to include the TEXT formulations. —Craig Stinson

DATABASES

Searching and Sorting Birth Dates in Approach



I'm having difficulty searching by date in Lotus Approach. My database has several fields with a field type of date, such as birth date. How can I find only the September birth dates? I have tried to search in Find mode using 09//* and 09/??/??, but this doesn't work.*

I'm also having trouble sorting the records the way I want them. I can sort by birth date, but the sort is by year. For example, I get 1/1/55, 2/1/55, and 1/2/56. How can I sort the records so that birth dates appear in order by month and day, regardless of year, such as 1/1/55, 1/2/56, and 2/1/55?

ROBERT TOLMACH
New York, NY

PC MAGAZINE: Entering either 9* or 9/*/* in Find mode will find all records with a birth date in September. As you've discovered, putting a 0 in front of the 9 throws Approach off for some reason, as does entering 9/??/??, even though it would seem to make perfect sense. My advice: When these syntax rules become frustrating, you can often find relief in Approach's Find Assistant.

For example, to find all rows with a September birth date, click on the Find Assistant button while in Find mode and complete each of the steps in the resulting tabbed dialog. To find September birth dates, make

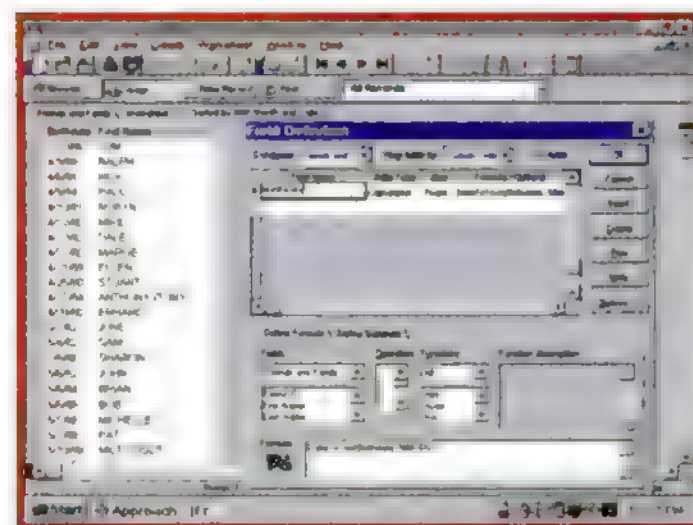


FIGURE 2: You can use a calculated field to sort your Approach birth dates by month and day.

sure Basic Find is selected in the Find Type tab, then choose the Next button. This leads to the Condition 1 tab. Highlight the Birth-date field and then select the "is equal to the month" operator, since we're going to look for birth dates that fall in September. Next, click on "this month" in the values section and change it to "September." At this point a glance at the Description area will reveal an explanation of the Find you've just created. Choose Done and Approach will find the matching records.

To sort in month/day order, start by creating a calculated field to hold just the month and day. First, select the Create menu and choose Field Definition. Then scroll to the first empty line to start a new field. Enter "MonthDay" for the field name and choose Calculated for the field type. Next, click Options and enter the following text in the formula area:

```
DateToText(Birthdate,'mm/dd')
```

This tells Approach to extract the month and day from Birthdate and format it in the mm/dd format. Choose OK to tell Approach to save your changes.

Now you have a MonthDay field that you can use to sort your records in month/day order. To see how this works, create a Worksheet by selecting the Create menu and choosing Worksheet. Then select a few fields and choose Done. When it's created, select the Worksheet menu, choose Sort, choose Define, and then add the MonthDay field to the Sort Order. That'll take care of sorting the records in month/day order. It's possible though, that you may have several people with the same birthday, perhaps born in different years. So that *these* records sort in ascending order, add the Birthdate field to the sort order too, right below the MonthDay field. Then choose OK.

Figure 2 shows an example worksheet sorted this way, alongside the field definition dialog for the MonthDay calculated field. Note that you can sort on the MonthDay field even though it's not made visible in the worksheet.

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sheet, you'll have to create a macro. To do this, select the Edit menu and choose Edit macros, then choose New. You'll find that Approach has automatically inserted two lines: a View line and a Sort line. Highlight and delete the View line. That'll leave just the Sort line, which is already set up to sort in month/day order. Select the text in the Macro name text box and replace it with a name for this macro, say "SortForReport," then choose OK to save the macro. Choose Done to close the Macros dialog.

To run the macro automatically whenever

If you want to sort in month/day order by default whenever you switch to the Worksheet, you must create a macro.

you switch to the Worksheet view, you'll need to change the worksheet's "On switch to" macro property. To do so, switch to Design mode and press Alt-Enter to open the properties InfoBox. Make sure the InfoBox is displaying the Worksheet properties, then click on the Macros tab. In the "On switch to" section, choose the SortForReport macro, then close the InfoBox. At this point, choose the File menu and select Save Approach File to save your work. Now whenever you select the worksheet, the information will be automatically sorted in month/day order.—*Sal Ricciardi*

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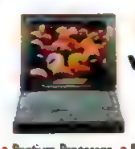
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56

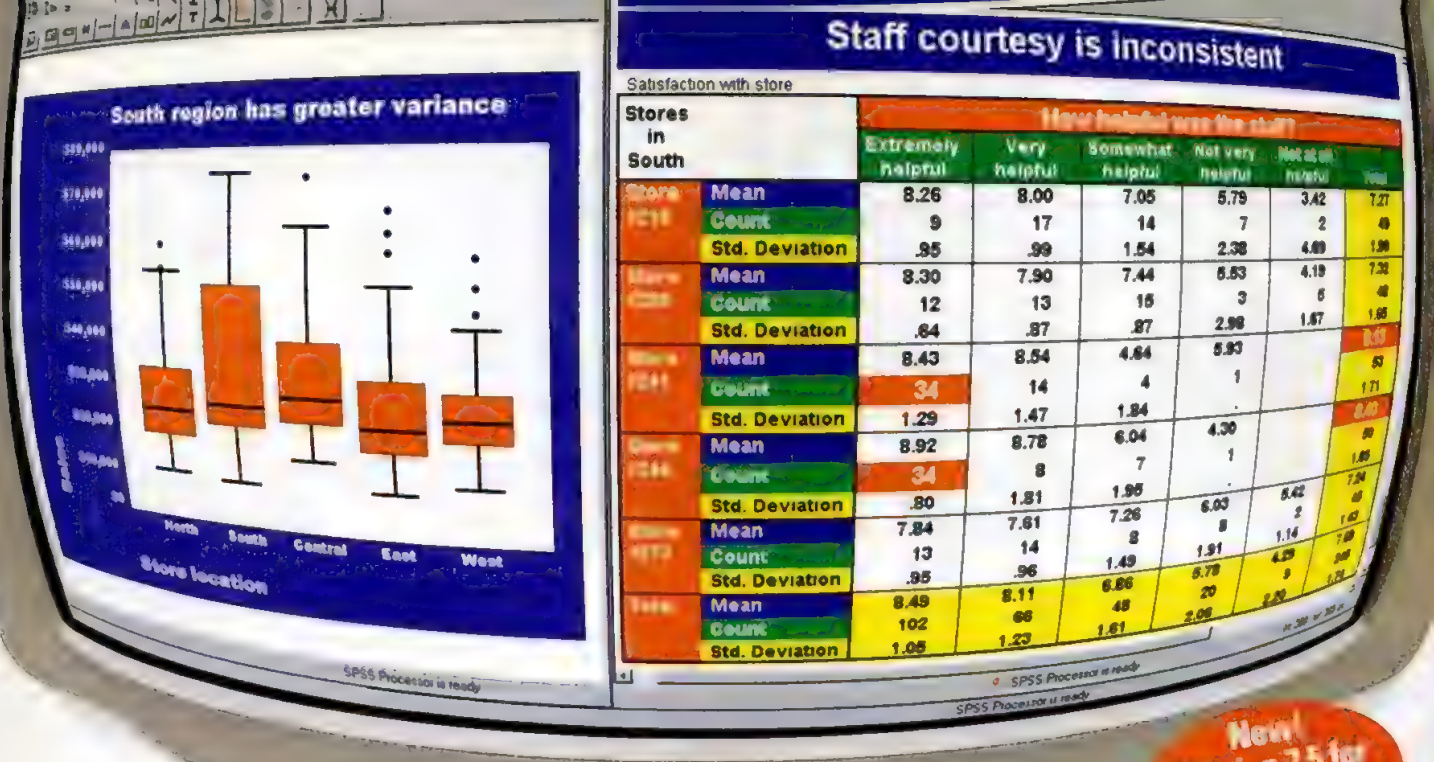
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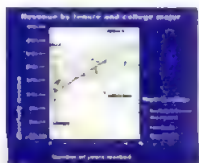
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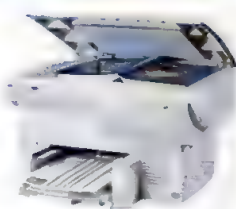
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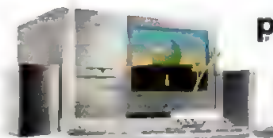


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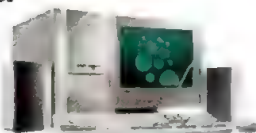
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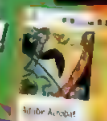
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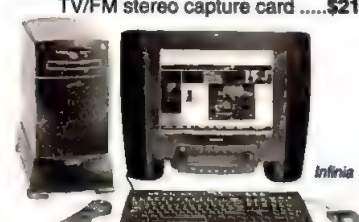
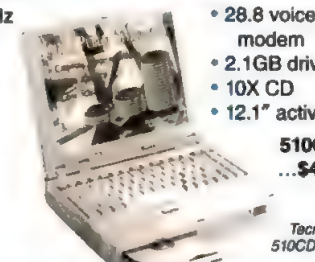
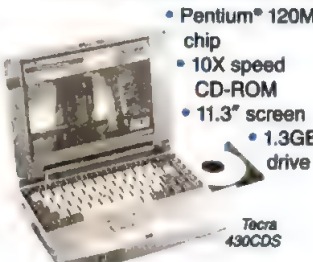
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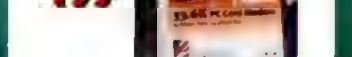
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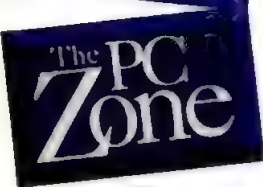


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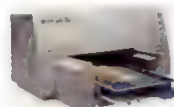
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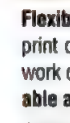


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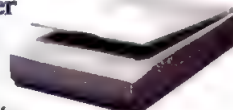
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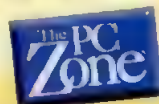
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326 - 342

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Communications.....	330	
Computer Systems.....	331	346
Input/Data Acquisition/Barcode/POS.....	332	347
Mass Storage Devices.....	332,334	
Multi-Media.....	336	
Music/Midi.....	336	
Networking.....	336	
Peripherals.....	337	349
Power Supplies.....		349
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	PREMIER	CLASSIFIED
Barcode.....		349
Business Applications.....	337	349
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Business Utilities.....	337	
CD-ROM Titles.....		350
Cellular Phones.....		
Communications.....		338

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343 - 355

Data Entry.....	
Database.....	
Desktop Publishing.....	
Education.....	338,339
Entertainment/Games.....	339
Financial/Accounting.....	338
Foreign Languages/Font/Translation.....	
Graphics/Design/CAD.....	341
—Digital Output Service.....	
Health/Fitness/Nutrition.....	
Human Resource.....	
Mailing List Management.....	
Manufacturing/Inventory.....	
Mapping/Demographic.....	350
Medical/Dental.....	
Multi-Media.....	337,339
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356

Religion.....	350
Scientific/Engineering.....	
Security.....	340,342
Shareware/Public Domain.....	
Statistical/Research.....	
Utilities.....	
Windows.....	
Adult.....	353

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	PREMIER	CLASSIFIED
Computer Insurance.....		
Data Conversion/Data Recovery.....		351
Desktop Publishing.....		
On-Line.....	340	
Scanning Services.....		
Software Duplication.....		352
Training/Tutorial.....		

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	PREMIER	CLASSIFIED
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Books/Catalogs.....		
Business Opportunities.....		
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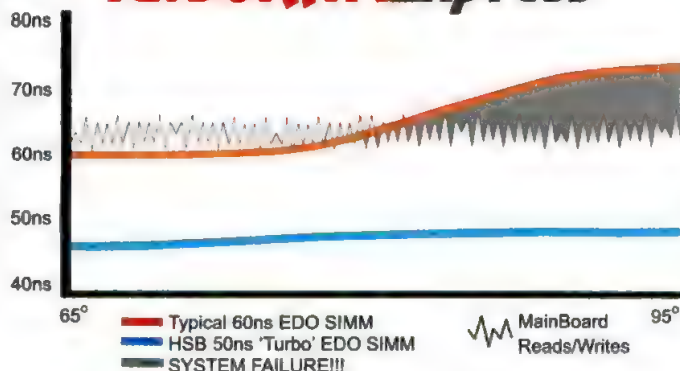
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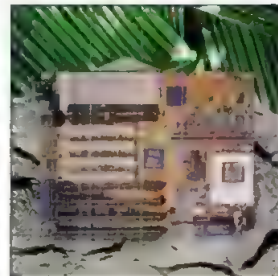
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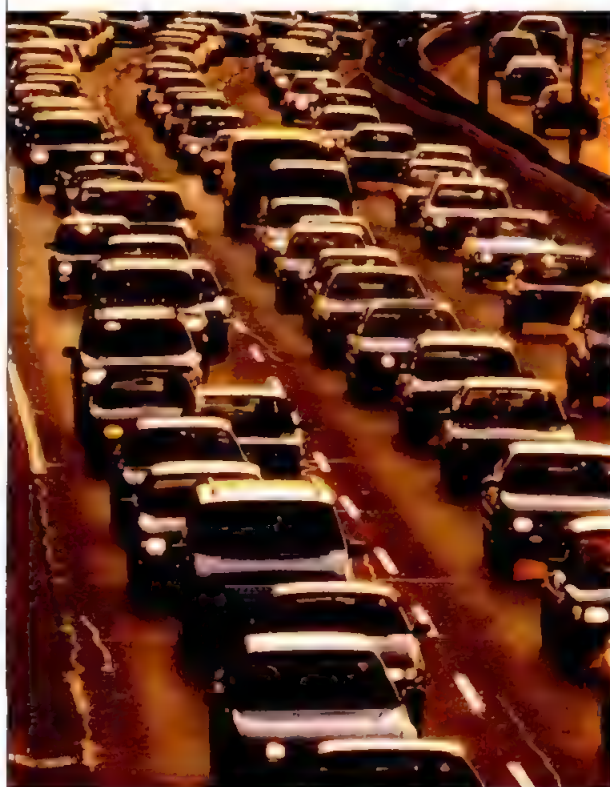
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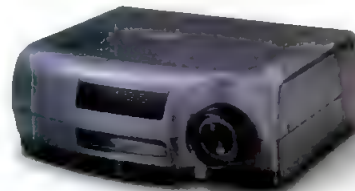
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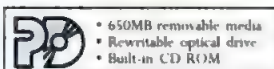
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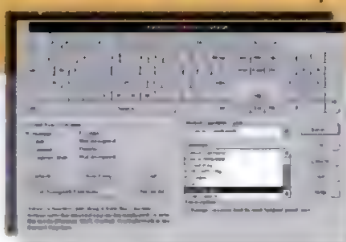
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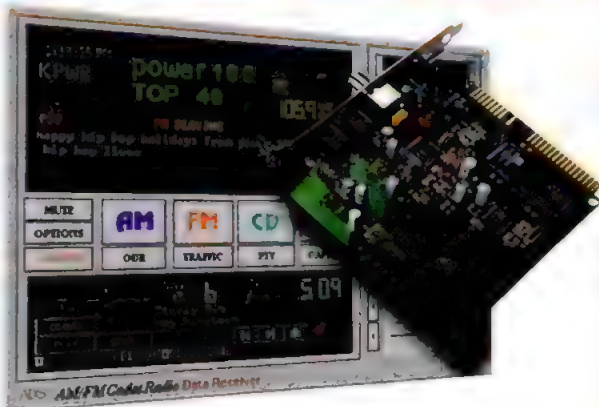
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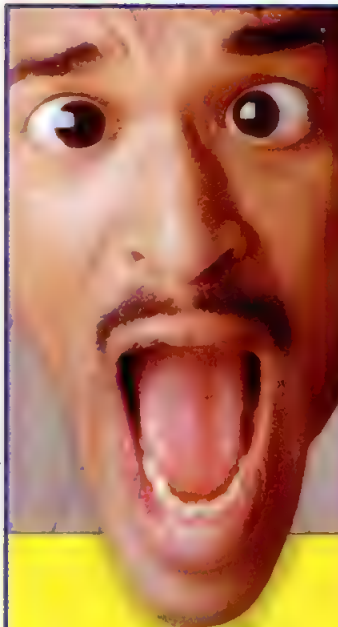


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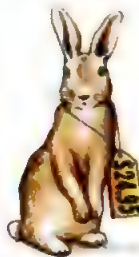
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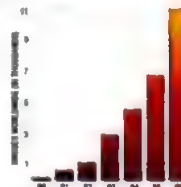
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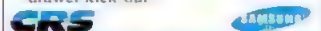
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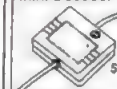
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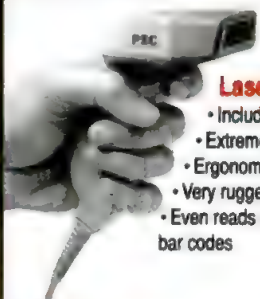
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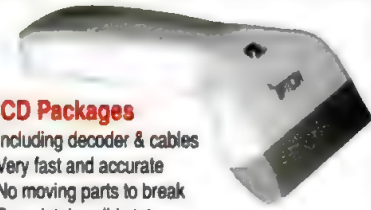
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The Lighter Side of Death

Psygnosis's cartoon-style adventure game is highly entertaining—but frustrating as well.

Discworld II: Mortality Bytes

Light-hearted adventure games such as *The Secret of Monkey Island* and the *Leisure Suit Larry* series are often just as challenging as their dramatic counterparts. The difference is that the challenge is in some degree hidden behind a comedic veil. *Discworld II: Mortality Bytes*, from Psygnosis, is a good example of this genre, though the game often confuses the challenging with the impossible.

Discworld II is a two-CD game for Windows 95 or DOS 6.0 or later. Al-

though the game requires only a 486/100 processor with 8MB RAM, we recommend a Pentium-class system with 16MB RAM.

causes the pushcart to explode. He also manages to blow the Grim Reaper (who happens to be riding nearby) to the Island of XXXX. The blast causes Death to reflect on his calling, so he decides to take a holiday, feeling that drinking down a few brews on the beach is more fun than collecting souls.

Back in Rincewind's *Discworld*, things begin to go awry as people die but their souls do not leave their bodies. The residents aren't terribly happy with all the dead townspeople skulking about, so they dispatch Rincewind to bring Death back so people can get on with dying good and proper.

Game play is divided into four chapters. In the first two, you must help Death become a cinema star and an acclaimed singer. In the third, you must become Death and prove yourself a capable Grim Reaper. In the last, you must save Death from dying and restore him to his former position.

With Monty Python's Eric Idle as the voice of Rincewind, you might expect that every sentence or two would be a joke or sarcastic barb. You're right. Though the game is set in pseudo-medieval times,



there are plenty of inside jokes dealing with adventure games and object-oriented puzzles as well as a lot of general humor. The graphics are spectacular—about as close to an interactive Super VGA cartoon as you're going to get.

The game's biggest drawback is that the puzzles are cartoonish in character and have solutions so bizarre and obscure that you have to think like a cartoon to solve them.

This isn't always a bad thing, and many games have succeeded with this approach in the past, but *Discworld II* may prove more

frustrating than fun for players accustomed to logical puzzle solving. For example, at one point in the game you must destroy a wall. When you try to do so with your 1-ton wrecking ball, Rincewind tells you to use a heavier ball. What must you do? You must glue a note with the number 10 to the ball, which then makes it weigh 10 tons. This solution may not seem intuitive, but it's one of the easiest puzzles in the game.

So is this the adventure game you've been dying to play? Try it only if you enjoy cartoon-style games and are able to think like a cartoon character.

—Shane Mooney



IN AFTER HOURS

The Lighter Side of Death

Discworld II:	
Mortality Bytes	359
Mm, Mm, Good?	
Pod	362
Rebel Moon Rising	362
Space Station Simulator	362

The Third Dimension	368
Quick Clips	362
Draw Your Own Adventure	
Ori's Draw-A-Story	370
Smoke and Mirrors	
Magic: The Gathering—	
Battlemage	370

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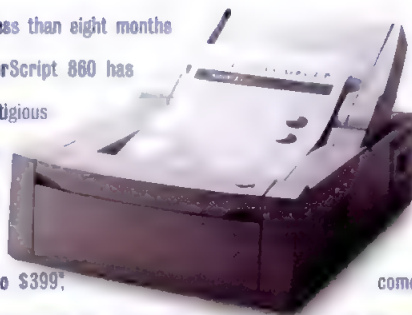
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Mm, Mm, Good?

MMX holds great potential for games, but this early crop left us unimpressed.

Pod

UbiSoft's futuristic racing game is an excellent showcase for MMX technology, but it often favors flash over function.

By the time you read this, Pod will be available as a single CD-ROM containing both Pentium and MMX versions of the game. We tested only the MMX version,

to buy an MMX PC? No way.

The Need For Speed SE did the skid mark thing over a year ago. Besides, you'll be too engrossed in the race to notice the clouds, and the pattern of shadows on your car never change even when you go into tunnels.

We found it very difficult to control the cars in Pod:

The science-fiction physics of the game often lead to oversteering and then to overcorrecting. Finally, it is often difficult to tell which way you're supposed to go at various points on the Pod tracks.

Still, Pod is an impressive racing game and a lot of fun to play, especially over a LAN or the Internet, with up to seven other players. You won't want to upgrade just to

have this game, but if you're going to upgrade anyway, you'll have a blast playing Pod. —MER

Rebel Moon Rising

Though it boasts high-resolution graphics and at least one good special effect, Rebel Moon Rising, GT Interactive's MMX-only first-person shoot-'em-up, is an uninspired entry into an already crowded genre.

As with Pod, Rebel Moon Rising requires 16-bit color to run. As we went to press, GT Interactive had no plans to release a Pentium-only version of the game. We tested the shareware release of Rebel

Moon Rising for this review, but the full, commercial version of the game should be available by the time you read this.

The plot is interesting: You must undertake a number of missions (5 in the shareware version, 21 in the commercial one) against United Nations shock troops in an effort to liberate the moon from Earth control.

Unfortunately, the missions are not exciting, and the enemies are even less so. Most missions end up as frantic find-the-hidden-switch searches.

Except for decent light-sourcing effects, the game's graphics are not very good (despite the fact that they run as high as 1,280-by-1,024 with

64,000 colors). High resolutions are simply no substitute for creativity and artistic flair. In fact, the 320-by-200 graphics and the mission designs in Dark Forces put Rebel Moon Rising's to shame.

Even if you do decide on an MMX machine, we recommend you look into games such as Quake, Duke Nukem 3D, Hexen, and Dark Forces for your first-person action thrills.—MER

QUICK CLIPS



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Crayola Magic 3D Coloring Book

Since it does not let kids create their own images from scratch, this multimedia coloring book is best suited for the younger portion of its intended age range (3 to 8). But the product's 70 pictures, 42 colors, and 13 textures are sure to get those creative juices flowing. \$40 street; IBM Corp., 800-426-7235, www.ibm.com.



Emperor of the Fading Suns

Destined to be a classic, Emperor offers a deep and unique story, highly challenging and addictive game play, and outstanding graphics and music. Make sure you download the patch from SegaSoft's Web site, though, to keep the game from crashing every few minutes. \$44.99 list; SegaSoft, 888-734-2763, www.segasoft.com.



which requires 16-bit color.

In Pod, you drive one of 8 slab-like cars around 16 different tracks. Unlike similar racing games, such as The Need for Speed SE, Pod has a science-fiction theme, so the cars and the scenery are suitably bizarre.

We were very impressed with the speed of the game and the many visual effects Pod threw at us without slowing down game play. As you whip around the track, your car leaves skid marks on the road, clouds move overhead, and shadows dance over your car's surface. But are these reason enough

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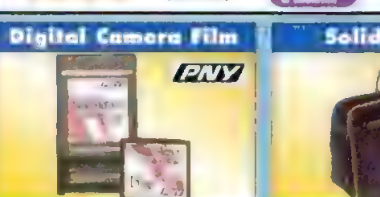


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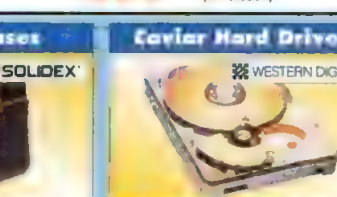
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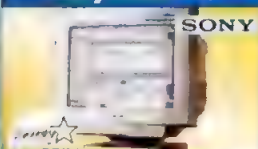
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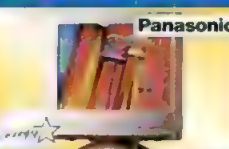


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After Hours



Space Station Simulator

Maris has a well-earned reputation for developing fun, easy, and informative software based on space and astronomy. Space Station Simulator keeps that reputation intact and shows off the power of MMX in the process.

We tested the MMX version of Space Station Simulator, which requires 16-bit color. A Pentium version of the title is also available.

With this program, you construct your own International Space Station and then walk through it using Maris's impressive virtual reality graphics engine. You select various modules (all based on real-world components) and attach them to form your station. The program provides plentiful information as well as some animations to describe what each module does.

You can view your assembled space station from the outside by using the Space-walk feature, which provides a beautifully rendered 3-D image of your creation. Or you can take a virtual tour through the station by means of the Go Inside feature, which offers a stunning first-person rendition

of each module.

The interface could be a bit more intuitive but, all things considered, this should delight anyone with an interest in the space program. Best of all, you won't need to upgrade to appreciate this impressive title.
—MER

The Third Dimension

Davidson & Associates' The Third Dimension is bundled with several MMX systems; it will not be available as a separate product. Why are we covering it here? Because it is one of the finest examples we've seen of a developer taking real advantage of what MMX technology has to offer.

At the time we prepared this review, the title was bundled only with MMX systems from a limited number of vendors:

Compaq, Fountain, Gateway 2000, IBM, NEC, Packard Bell, and Sony.

When you enter into The Third Dimension, you can

create scenes filled with 3-D objects, then color and texture them in a variety of ways. You can also add special lighting effects and some funky animations. Compared with similar packages, such as IBM's Crayola Magic 3D Coloring Book, The Third Dimension is truly a work of art.

You can't really do anything with your 3-D creations except enjoy them for what they are, but we still feel that The Third Dimension demonstrates the power of MMX technology better than most other programs we've seen so far. Perhaps Davidson will reconsider the decision and market the title on its own.—MER



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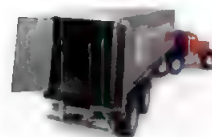
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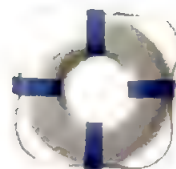
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Draw Your Own Adventure

Broderbund's delightful new storybook software calls upon kids' creative flair.

Orly's Draw-A-Story

Introduce your kids to two wonderful new friends, the warm island culture of Jamaica, and the beauty and power of their own imagination. The stars of Orly's Draw-A-Story are Orly (exactly seven and three-quarters) and her best friend Lancelot, a frog. Together, they tell some grand stories while helping kids write and illustrate their own.

The game is designed for kids ages 5 to 10 and runs on Windows 3.x, Windows 95, and Apple Macintosh computers. On the PC, the title requires a 486/33 CPU, 8MB of RAM, and a 2X CD-ROM drive, but

a faster CPU and more RAM will enhance your enjoyment.

Kids can start out with a quick tutorial or jump right into a story. The title includes four basic tales, and kids get to draw seven to ten key story elements for each one.

The fun begins as Orly tells them what to draw and helps get them started. For example, if they're drawing a person or a creature, the eyes and mouth are automatically filled in and animated on the drawing pad. If the kids get stumped, they can turn to the Idea Shuttles for some outlines. The program provides such features as 32 cans of paint, colored pencils, a



sponge and eraser, and 96 wacky textures and patterns. Two additional characters, New and Undo, are there to help out in case of an artistic emergency.

Beyond the four basic stories, kids can also create their own tales from scratch with the Make Your Own Storybook

feature. Orly will provide some ideas for getting started, but there are no set guidelines limiting what kids can create here.

Inspiring, encouraging, open-ended, and above all, fun, Orly's Draw-A-Story is a top-notch title that's sure to be a big hit with kids.—*Mary E. Behr*

Smoke and Mirrors

The PC version of a staggeringly successful card game proves disappointing.

Magic: The Gathering—Battlemage

In the role-playing fantasy game Magic: The Gathering, two players duel by using a deck of cards. These cards contain a variety of different spells, magic items, creatures, and forms of power that players can use to hurl magical attacks.

Magic: The Gathering—Battlemage transfers this system to the PC as a real-time fantasy combat game. This com-

bat can result in a lot of action on-screen and can slow down general processing time. The recommended basic system for

Battlemage is a Pentium/75 with 16MB of RAM, but a P100 is closer to reality.

Players build their decks from a selection of over 200 spell cards, then enter a duel. Combat is from a top-down perspective on a variety of landscapes and can be played against the computer or against another player over LAN or modem connections.

Several problems cripple Battlemage. Game play is never properly explained, and though Acclaim touts Battlemage as easy to learn, it's anything but. The documentation is confusing, and the tutorial is not only incorrect but skips some of the most important and challenging parts.

The game inter-

face hinders play to such a degree that it leads to another major problem: play balance. During a duel, cards can either be stacked in a corner, where you can't see them, or spread out on the screen, obscuring the playing field. Scrolling through them is a chore, and the various descriptions and spells found on actual Magic cards are either missing or hard to access. Juggling this cumbersome interface is so difficult that the computer opponent typically cleans your clock before you have time to prepare an attack.

Other problems include a lack of card information in the deck-building utility and a confusing campaign engine. This is a shame, since the rendition of the battlefield is quite good. Sadly, it's impossible to enjoy because of a core design that thwarts the player at every turn.—*T. Liam McDonald*



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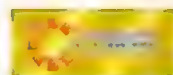
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Document # 1118

Advertisers' Index COMPANIES

Reader Service No.	Advertiser	Page
*	3 Com Corporation	NE18
087	Acer America	92 @
076	Acer America	96 @
034	Acer America	202 @
226	ADI Systems Inc.	80 @
064	Advanced Logic Research	238 W95
113	AGFA	197
342	American Power Conversion	117 @
235	AMS Tech	41 @
*	Apple Computer	67
336	Arlington Computer Products	318
172	Avatar Systems	358
292	Caere Corporation	8 @
177	Cardiff Software	240 W95
894	Cheyenne Software	NE22
*	Chrysler Corporation	78-79
*	Claris Corporation	157
*	Compaq Computer Corporation	NE8
*	Compaq Computer Corporation	74-75
*	CompUSA Direct	309-312
360	COMPUTER DISCOUNT WAREHOUSE	50-51 @
109	COMPUTER DISCOUNT WAREHOUSE	280-281 @
129	COMPUTER DISCOUNT WAREHOUSE	282-283 @
188	COMPUTER DISCOUNT WAREHOUSE	284-285 @
318	COMPUTER DISCOUNT WAREHOUSE	286-287 @
017	Connectix	241 W95
362	Corel Corporation	104 @
044	Corel Corporation	185 @
042	Corel Corporation	219 @
103	Corel Corporation	357 @
207	Corel Corporation	361 @
037	Corel Corporation	372 @
*	Cornerstone Technology	210
095	Creative Labs	173-177 @
*	CTX OPTO	236 W95
248	Data Translation, Inc.	138 @
008	DataViz	257 W95 @
102	DataViz	259 W95 @
272	Decisive Technology	244 W95
*	Dell Computer Corporation	C5-C8
*	Dell Computer Corporation	12-13
*	Dell Computer Corporation	38-39
*	Dell Computer Corporation	72
*	Dell Computer Corporation	178-179
*	Diamond Multimedia Systems	135
*	Diamond Multimedia Systems	137
*	Digital Equipment Corp.	NE27
896	Eicon Technology	NE26 @
*	EIZO NANO Technologies, Inc.	222
048	Epson America	31
005	Epson America	88
213	Executive Software	230 W95 @
014	First Source International	306-307 @
070	Forefront Group	155 @
224	Fujitsu PC Corporation	90-91 @
*	Gateway 2000	125-131
026	Graphsoft, Inc.	248 W95 @
162	Hansol Corporation	59
062	HARTFORD COMPUTER GROUP	319 @
881	Hayes Microcomputer Products	NE25
063	Helix Software Co.	242-243 W95 @
*	Hewlett Packard	26-27

Reader Service No.	Advertiser	Page
*	Hewlett Packard	52-53
*	Hewlett Packard	162
*	Hewlett Packard	207
*	Hewlett Packard	220-221
143	Hitachi	265 W95 @
*	IBM Corporation	160-161
*	Imation	200
024	In Focus Systems	271 W95 @
390	In Focus Systems	273 W95 @
278	Insight Direct	304-305 @
*	Intel Corporation	NE12-NE13
*	Intel Corporation	121
145	Iomega Corporation	189
244	Iomega Corporation	368-369
195	J&R Music World	364-367 @
096	Kingston Technology	213 @
106	Kingston Technology	246-247 W95 @
264	KSL Monitor	245 W95 @
019	L.A. Trade	325
*	Leap Frog Labs	298-299
*	Logitech	278 W95
*	Lotus Development Corporation	22-23
144	Macromedia	272 W95 @
031	MAG InnoVision	18-19 @
344	MapInfo Corp.	260 W95
090	MARKHAM COMPUTER CORP.	301
299	McAfee Associates, Inc.	229
283	MEGAHAUS	290 @
173	Memory Express	266 W95 @
130	MGI Software Corporation	274 W95 @
391/138	Micro Mall/H.Co.	322
856	Micro Solutions Computer Products	289 @
855	Micro Solutions Computer Products	323 @
003	Micro Warehouse	316-317 @
*	Micrografx	71
924	Micron Electronics	NE2-NE3 @
203	Micron Electronics	5 @
120	Micron Electronics	15 @
119	Micron Electronics	16-17 @
164	Micron Electronics	48A-48F @
013	Micron Electronics	167-170 @
*	Microsoft	2-3
*	Microsoft	20
*	Microsoft	NE21
010	Midwest Computer Works	313 @
340	Minolta	199
280	Mitsubishi Electronic America, Inc.	250 W95 @
157	NEC Technologies	C2-C4, p1
107	NEC Technologies	64-65
153	NEC Technologies	98-99
155	NEC Technologies	360
300	NETCOM	158
266	Netgear	84
086	NewSoft, Inc.	261 W95 @
*	Nokia	86
394	Olivetti	204 @
*	Oracle Corp.	NE5
047	PC Connection	314-315
080	PC Power and Cooling	94 @
199	PC Zone	320-321 @
092	PCs Compleat	292-293 @
192	PCs Compleat	294-295 @

Reader Service No.	Advertiser	Page
268	PCs Compleat	296 @
015	Philips Electronics	144
171	PictureTel	276 W95
193	Play Inc.	363 @
196	Plextor	186
131	Portrait Display Labs	258 W95 @
176	PowerQuest	253 W95
125	PowerQuest	255 W95
038	Powersoft	132 @
348	Premio Computers, Inc.	217 @
287	ProGen Systems	118 @
132	Proxima	263 W95
884	QMS	NE24
310	QMS	264 W95
886	QUALCOMM INC.	NE7
074	Quantex	147-149
880	Quarterdeck Office Systems	NE23
007	Rainbow Technologies	239 @
081	Raptor Systems	152
205	RICOH CORP.	32 @
309	S.A.G./Storage Solutions	55 @
146	Sceptre Technologies	275 W95
879	Seagate Software	NE11 @
271	Seagate Technologies	181 @
030	Smith Micro Software, Inc.	249 W95 @
*	SPSS, Inc.	308
*	Standard Microsystems Corp.	NE15-NE17
335	Sun Microsystems	60-61 @
023	Sun Microsystems	122 @
135	Sun Microsystems	156 @
*	Symantec Corporation	140
316	Sys Technology	270 W95
174	Techmedia	44 @
001	Tektronix Inc.	151
066	Tiger Software/BLOC Publish Corp.	268-269 W95
378	Toshiba America	34-35
088	Traveling Software	262 W95 @
*	US Robotics Inc.	11
*	US Robotics Inc.	56-57
*	US Robotics Inc.	82-83
051	USA Flex	303 @
*	USR/Palm Computing Inc.	194
212	Utobia	277 W95 @
243	Viagrafix	267 W95 @
118	ViewSonic	68-69 @
117	ViewSonic	227 @
065	VisionTek	43 @
384	Western Digital Corp.	233 W95 @
115	Western Digital Corp.	235 W95 @
085	Winbook	77 @
163	Xerox Corporation	371
*	Xircor	25
*	ZD Net	97
*	Zenith Data Systems Direct	109-112 @

*No Reader Service#. Please Call Advertiser For More Information.

Advertisers' Index PRODUCTS

Reader Service No.

Company

Product

Page

ADD-ON BOARDS			
095	Creative Labs	AWE 64 Sound Card	173-177
248	Data Translation, Inc.	Broadway	138

APPLE PRODUCTS			
*	Apple Computer	Newton Message Pad 2000	67

AUDIO BOARDS			
095	Creative Labs	AWE 64 Sound Card	173-177

BACKUP SOFTWARE			
342	American Power Conversion	Backup Office	117
894	Cheyenne Software	ARCserve Network Backup	NE22

CD-ROM			
196	Plexor	CDROM	186

CHIPS/PROCESSORS			
096	Kingston Technology	Memory	213
019	L.A. Trade	Memory	325
391/138	Micro Mail/H.Co.	Memory, PCMCIA, Hard Drives	322

COMMUNICATIONS SOFTWARE			
070	Forefront Group	WebPrinter	155
299	McAfee Associates, Inc.	VirusScan	229
879	Seagate Software	Seagate Software-NSMG	NE11

COMPATIBLE KEYBOARDS			
109	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	280-281
129	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	282-283
188	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	284-285
318	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	286-287
*	Microsoft	Microsoft Keyboards	20

COMPUTERS/COMPATIBLES			
336	Arlington Computer Products	Mail Order, Peripherals	318
*	Compaq Computer Corporation	Compaq Direct Desktops	74-75
*	CompUSA Direct	Mail Order	309-312
109	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	280-281
129	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	282-283
188	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	284-285
318	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	286-287
*	Dell Computer Corporation	Dimension/Latitude/PowerEdge Servers	C5-C8
*	Dell Computer Corporation	Latitude	12-13
*	Dell Computer Corporation	Dimension	178-179
*	Dell Computer Corporation	Dimension	38-39
*	Dell Computer Corporation	PowerEdge	72
*	Digital Equipment Corp.	Digital PCs	NE27
*	First Source International	Memory, Notebooks, Peripherals	306
014	First Source International	Memory, Notebooks, Peripherals	306-307
*	Hewlett Packard	PCs	207
*	IBM Corporation	IBM ThinkPad	160
195	J&R Music World	Systems, Hardware, Peripherals	364-367
*	Leap Frog Labs	Desktops & Notebooks	298-299
*	Leap Frog Labs	Desktops & Notebooks	299
090	Batra International	Batra Systems & Notebooks	301
003	Micro Warehouse	Hardware, Software, Systems	316-317
119	Micron Electronics	Millenia Line-Millenia Lx/Mxe/Pro	16-17
164	Micron Electronics	Micron family of Products-Millenia/Home/	48A-48F
203	Micron Electronics	Service and Support	5
010	Midwest Computer Works	Hardware	313
153	NEC Technologies	NEC Powermate	98-99
394	Olivetti	Echo Notebooks	204
047	PC Connection	PCs, Peripherals, Software	314-315
199	PC Zone	Mail Order	320-321
348	Premio Computers, Inc.	Premio HX Systems	217
287	ProGen Systems	Desktop Computers	118
074	Quantex	Quantex Systems	147-149
309	S.A.G./Storage Solutions	Servers and Storage	55
174	Technimedia	Systems	44
378	Toshiba America	Desktop Computers	34-35
051	USA Flex	Notebooks, PCs, Peripherals, Printers	303
085	Winbook	XPS Pro and FX Notebooks	77
053	Zenith Data Systems Direct	PCs	109-112

DATA BASE MANAGERS			
*	Oracle Corp.	Oracle 7	NE5
038	Powersoft	Power Builder	132

DESK TOP PUBLISHING			
*	Micrografix	Flowcharter 7	71

DIGITAL CAMERAS			
340	Minolta	Minolta DIMAGE V	199

DISK BACKUP & TAPE DRIVES			
145	Iomega Corporation	Jaz	189
244	Iomega Corporation	Zip	368-369
856	Micro Solutions Computer Products	Backup 8000t	289
855	Micro Solutions Computer Products	Back Pack PO-CD	323

DISPLAYS/MONITORS			
087	Acer America	Acer Open	92
076	Acer America	Acer Open	96
226	ADI Systems Inc.	Monitors	80
*	Corning Technology	Monitors	210
*	EIZO NANO Technologies, Inc.	Monitors	222
162	Hansol Corporation	Hansol 17PX Monitors	59
031	MAG InnoVision	MAG InnoVision Monitors	18-19
010	Midwest Computer Works	Monitors	313
157	NEC Technologies	NEC Monitors	C2-p1
*	Nokia	Nokia Monitors	86
015	Philips Electronics	Monitors	144
117	ViewSonic	OptiQuest V775 17" Monitor	227
118	ViewSonic	ViewSonic's 17" GT775/PT775	68-69

FAX SOFTWARE			
*	Symantec Corporation	Norton Utilities/Norton AntiVirus	140

FAX/MODEM			
*	3 Com Corporation	XL Adapters	NE18

Reader Service No.

Company

Product

Page

FLOWCHARTING SOFTWARE			
*	Micrografix	GraphicsSuite 2	71

GRAPHICS SOFTWARE			
292	Caere Corporation	OmniPage Pro	8
362	Corel Corporation	CWPS7 Vertical Suites	104
044	Corel Corporation	CWS7/OP7 JAVA 2	185
042	Corel Corporation	Draw 7 simply outstanding	219
103	Corel Corporation	Internet	357
207	Corel Corporation	Corel Lumiere	361
037	Corel Corporation	Ventura Quotes	372
*	Micrografix	Flowcharter 7	71

HAND-HELD PC'S			
*	USR/Palm Computing Inc.	Pilot Organizer	194

HARD DRIVES			
172	Avatar Systems	Shark 250	358
145	Iomega Corporation	Jaz	189
244	Iomega Corporation	Zip	369
283	MEGAHAUS	Mass Storage	290
391/138	Micro Mail/H.Co.	Memory, PCMCIA, Hard Drives	322

HARDWARE			
*	3 Com Corporation	XL Adapters	NE18
113	AGFA	AGFA Scanners	197
235	AMS Tech	AMS Tech TravelPro Notebooks	41
*	Compaq Computer Corporation	Compaq Networking Products	NE8
*	Compaq Computer Corporation	Compaq Direct Desktops	74-75
095	Creative Labs	AWE 64 Sound Card	173-177
*	Dell Computer Corporation	Dimension/Latitude/PowerEdge Servers	C5-C8
*	Dell Computer Corporation	Latitude	12-13
*	Dell Computer Corporation	Dimension	178-179
*	Dell Computer Corporation	Dimension	38-39
*	Dell Computer Corporation	PowerEdge	72
*	Diamond Multimedia Systems	Stealth Graphics Boards	135
*	Diamond Multimedia Systems	SCSI	137
*	Digital Equipment Corp.	Digital PCs	NE27
896	Eicon Technology	Drva	NE26
048	Epson America	Epson Scanner	31
005	Epson America	ELP 5000	88
224	Fujitsu PC Corporation	Notebooks	90-91
182	Hansol Corporation	Hansol 17PX Monitors	59
881	Hayes Microcomputer Products	Hayes 58K Modem	NE25
*	IBM Corporation	IBM ThinkPad	160-161
*	Imation	Travan DT	200
*	Intel Corporation	Computer Enhancement Group	NE12-NE13
*	Intel Corporation	NetportExpress	121
145	Iomega Corporation	Jaz	189
244	Iomega Corporation	Zip	369
195	J&R Music World	Systems, Hardware, Peripherals	364-367
090	Kingston Technology	Memory	213
019	L.A. Trade	Memory	325
*	Leap Frog Labs	Desktops & Notebooks	298-299
283	MEGAHAUS	Mass Storage	290
120	Micron Electronics	Micron Memory Upgrades	15
*	Microsoft	Microsoft Keyboards	20
340	Minolta	Minolta DIMAGE V	199
266	Netgear	Ethernet Hub	84
*	Nokia	Nokia Monitors	86
394	Olivetti	Echo Notebooks	204
080	PC Power and Cooling	Power Protection/Cooling Devices	94
199	PC Zone	Mail Order	320-321
015	Philips Electronics	Monitors	144
196	Plexor	CDROM	186
348	Premio Computers, Inc.	Premio HX Systems	217
884	QMS	Network Printers	NE24
074	Quantex	Quantex Systems	147-149
205	RICOH CORP.	Ricoh Aficio Color Copiers	32
309	S.A.G./Storage Solutions	Servers and Storage	55
*	Standard Microsystems Corp	Ether Power II 10/100	NE15-NE17
174	Technimedia	Systems	44
001	Tektronix Inc.	p-350	151
378	Toshiba America	Desktop Computers	34-35
*	USR/Palm Computing Inc.	Pilot Organizer	194
117	ViewSonic	OptiQuest V775 17" Monitor	227
118	ViewSonic	ViewSonic's 17" PT775/GT775	68-69

HUBS			
*	Intel Corporation	NetportExpress	121
266	Netgear	Ethernet Hub	84

IMAGE EDITING SOFTWARE			
248	Data Translation, Inc.	Broadway	138

INTERNET			
*	Clarix Corporation	Clarix Home Page	157
070	Forefront Group	WebPrinter	155
*	Microsoft	NT IIS	NE21
300	NETCOM	Online Services	158
135	Sun Microsystems	Solaris	156
335	Sun Microsystems	JavaSoft	60-61

LABEL/FORM SOFTWARE			
292	Caere Corporation	OmniPage Pro	8

LAN ADAPTER BOARDS			
*	Intel Corporation	Computer Enhancement Group	NE12-NE13
*	Intel Corporation	NetportExpress	121
*	Xircom	Ethernet Adapter	25

LANGUAGES			
038	Powersoft	Power Builder	132

LAPTOP/PORTABLE COMPUTERS			
034	Acer America	Notebook Computers	202
235	AMS Tech	AMS Tech TravelPro Notebooks	41
*	Apple Computer	Newton Message Pad 2000	67
*	Compaq Computer Corporation	Compaq Direct Desktops	74-75
003	Micro Warehouse	Hardware, Software, Systems	316-317
*	CompUSA Direct	Mail Order	309-312
109	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	280-281

Advertisers' Index PRODUCTS

Reader Service

No.	Company	Product	Page
129	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	282-283
188	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	284-285
318	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	286-287
360	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	50-51
014	First Source International	Memory, Notebooks, Peripherals	306-307
224	Fujitsu PC Corporation	Notebooks	90-91
082	Gateway 2000	Notebooks, PCs, Mail Order, Peripherals	125-131
082	HARTFORD COMPUTER GROUP	Mail Order	319
082	IBM Corporation	IBM ThinkPad	160-161
195	J&R Music World	Systems, Hardware, Peripherals	364-367
090	Matrox International	Video Systems & Notebooks	301
013	Micro Electronics	Transport	167-171
010	Midwest Computer Works	Laptop/Portable	313
107	NEC Technologies	Versa	64-65
394	Olivetti	Echo Notebooks	204
109	PC Zone	Mail Order	320-321
092	PCs Complete	PCs, Notebooks, Software	292-293
192	PCs Complete	PCs, Notebooks, Software	294-295
269	PCs Complete	PCs, Notebooks, Software	296
051	USA Flex	Notebooks, PCs, Peripherals, Printers	303
085	USR/Palm Computing Inc.	Pilot Organizer	194
085	Winbook	XPS Pro and FX Notebooks	77

LOCAL AREA NETWORKING

3	Com Corporation	XL Adapters	NE18
3	Compaq Computer Corporation	Compaq Networking Products	NE8
109	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	280-281
129	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	282-283
188	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	284-285
318	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	286-287
082	HARTFORD COMPUTER GROUP	Mail Order	NE26
082	Intel Corporation	Computer Enhancement Group	NE12-NE13
082	Intel Corporation	NetPortExpress	121
266	Netgear	Ethernet Hub	84
884	OMS	Network Printers	NE24
879	Seagate Software	Seagate Software-NSMG	NE11
879	Standard Microsystems Corp.	Ether Power II 10/100	NE15-NE17

MAIL ORDER

336	Arlington Computer Products	Mail Order, Peripherals	318
336	CompUSA Direct	Mail Order	309-312
109	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	280-281
129	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	282-283
188	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	284-285
318	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	286-287
014	First Source International	Memory, Notebooks, Peripherals	306-307
278	Gateway 2000	Notebooks, PCs, Mail Order, Peripherals	125-131
195	J&R Music World	Systems, Hardware, Peripherals	364-367
391/138	Micro Mail/H Co.	Memory, PCMCIA, Hard Drives	322
010	Midwest Computer Works	Reseller	313
047	PC Connection	PCs, Peripherals, Software	314-315
189	PC Zone	Mail Order	320-321
092	PCs Complete	PCs, Notebooks, Software	292-293
192	PCs Complete	PCs, Notebooks, Software	294-295
269	PCs Complete	PCs, Notebooks, Software	296
074	Quantex	Quantex Systems	147-149
051	USA Flex	Notebooks, PCs, Peripheral Printers	303
085	Winbook	XPS Pro and FX Notebooks	77
053	Zenith Data Systems Direct	PCs	109-112

MASS STORAGE

172	Avatar Systems	Shark 250	358
096	Imation	Imation DT	200
145	Iomega Corporation	Jaz	189
244	Iomega Corporation	Zip	368-369
856	Micro Solutions Computer Products	Backpack 8000	289
856	Micro Solutions Computer Products	Back Pack PD-CD	323
271	Seagate Technologies	Tape Drives	181

MEMORY

014	First Source International	Memory, Notebooks, Peripherals	306-307
096	Kingston Technology	Memory	213
019	L.A. Trade	Memory	325
391/138	Micro Mail/H Co.	Memory, PCMCIA, Hard Drives	322
120	Micron Technology	Micron Memory Upgrades	15
880	Quarterdeck Office Systems	Networking Software	NE23
065	VisionTek	Extreme Drive	43

MISCELLANEOUS

183	Play Inc.	Snappy	363
-----	-----------	--------	-----

MODEMS

3	Com Corporation	XL Adapters	NE18
3	Diamond Multimedia Systems	Stealth Graphics Boards	135
096	Diamond Multimedia Systems	SCSI	137
806	Econ Technology	Diva	NE26
881	Hayes Microcomputer Products	Hayes 56K Modem	NE25
0	US Robotics Inc.	X2	11
0	US Robotics Inc.	Video	82-83

MULTIMEDIA

0	CompUSA Direct	Mail Order	309-312
095	Creative Labs	AWE 64 Sound Card	173-177
248	Data Translation, Inc.	Broadway	138
856	Micro Solutions Computer Products	Backpack 8000	289
856	Micro Solutions Computer Products	Back Pack PD-CD	323
0	Nokia	Nokia Monitors	86
384	Olivetti	Echo Notebooks	204
196	Plextor	CDROM	186

MULTIMEDIA SOFTWARE

362	Corel Corporation	CWPS7 Vertical Suites	164
044	Corel Corporation	CWS7/OP7 JAVA 2	219
042	Corel Corporation	Draw 7 simply outstanding	219
103	Corel Corporation	Internet	357
207	Corel Corporation	Corel Lumiere	361
037	Corel Corporation	Ventura Quotes	372
0	Micrografx	Flowchart 7	71

NETWORK INTERFACE CARDS

3	Compaq Computer Corporation	Compaq Networking Products	NE8
---	-----------------------------	----------------------------	-----

Reader Service

No.	Company	Product	Page
3	Standard Microsystems Corp.	Ether Power II 10/100	NE15-NE17
3	Xircor	Ethernet Adapter	25

NETWORKING SOFTWARE

894	Cheyenne Software	ARCserve Network Backup	NE22
0	Microsoft	NT IIS	NE21

OCR PRODUCTS

292	Caere Corporation	OmniPage Pro	8
183	Xerox Corporation	TextBridge Pro 96	371

ON LINE DATABASE/SERVICES

300	NETCOM	Online Services	158
0	ZD Net	ZD Net	97

OPTICAL PERIPHERALS

015	Philips Electronics	Monitors	144
-----	---------------------	----------	-----

ORGANIZATIONAL SOFTWARE

0	Microsoft	Microsoft Office	2-3
---	-----------	------------------	-----

PC DIRECT

336	Arlington Computer Products	Mail Order, Peripherals	318
336	CompUSA Direct	Mail Order	309-312
109	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	280-281
129	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	282-283
188	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	284-285
318	COMPUTER DISCOUNT WAREHOUSE	Laptop/Portable	286-287
360	COMPUTER DISCOUNT WAREHOUSE	Reseller	50-51
014	First Source International	Memory, Notebooks, Peripherals	306-307
062	HARTFORD COMPUTER GROUP	Mail Order	319
278	Insight Direct	Insight Mail Order	304-305
019	L.A. Trade	Memory	325
283	MEGAHAUS	Mass Storage	290
063	Micro Warehouse	Hardware, Software, Systems	316-317
856	Micro Solutions Computer Products	Backpack 8000	289
856	Micro Solutions Computer Products	Back Pack PD-CD	323
010	Midwest Computer Works	Reseller	313
047	PC Connection	PCs, Peripherals, Software	314-315
199	PC Zone	Mail Order	320-321
092	PCs Complete	PCs, Notebooks, Software	292-293
192	PCs Complete	PCs, Notebooks, Software	294-295
269	PCs Complete	PCs, Notebooks, Software	296
051	USA Flex	Notebooks, PCs, Peripherals, Printers	303

PCMCIA

391/138	Micro Mail/H Co.	Memory, PCMCIA, Hard Drives	322
0	US Robotics Inc.	X2	11
0	US Robotics Inc.	Modems	56-57
0	US Robotics Inc.	Video	82-83
0	Xircor	Ethernet Adapter	25

PERIPHERALS

3	Com Corporation	XL Adapters	NE18
113	AGFA	AGFA Scanners	197
336	Arlington Computer Products	Mail Order, Peripherals	318
0	Diamond Multimedia Systems	Stealth Graphics Boards	135
048	Diamond Multimedia Systems	Epson Scanner	137
005	Epson America	ELP 5000	88
014	First Source International	Memory, Notebooks, Peripherals	306-307
0	Gateway 2000	Notebooks, PCs, Mail Order, Peripherals	125-131
182	Hansol Corporation	Hansol 17PX Monitors	59
881	Hayes Microcomputer Products	Hayes 56K Modem	NE25
0	Imation	Travan DT	200
195	J&R Music World	Systems, Hardware, Peripherals	364-367
0	Microsoft	Microsoft Keyboards	20
340	Minolta	Minolta DIMAGE V	199
0	Nokia	Nokia Monitors	86
047	PC Connection	PCs, Peripherals, Software	314-315
015	Philips Electronics	Monitors	144
884	OMS	Network Printers	NE24
001	Tektronix Inc.	p-350	151
117	ViewSonic	OptiQuest V775 17" Monitor	227
118	ViewSonic	ViewSonic's 17" P7775	68-69
0	Xircor	Ethernet Adapter	25
053	Zenith Data Systems Direct	PCs	109-112

POWER PROTECTION

342	American Power Conversion	Backup Office	117
080	PC Power and Cooling	Power Protection/Cooling Devices	94

PRINTER ACCESSORIES

884	OMS	Network Printers	NE24
-----	-----	------------------	------

PRINTERS

048	Epson America	Epson Scanner	31
005	Epson America	ELP 5000	88
0	Hewlett Packard	LaserJet	162
0	Hewlett Packard	HP Cash in Trade Up	26-27
155	Hewlett Packard	Sphinx Multi-Purpose Printers	52-53
0	NEC Technologies	NEC printers	90
884	OMS	Network Printers	NE24
205	RICOH CORP.	Ricoh Aficio Color Copiers	32
001	Tektronix Inc.	p-350	151
051	USA Flex	Notebooks, PCs, Peripherals, Printers	303

PROGRAM DEVELOPERS

038	Powersoft	Power Builder	132
007	Rainbow Technologies	Rainbow Sentinel Software Protection	239

PROGRAMMERS TOOLS UTILITIES

007	Rainbow Technologies	Rainbow Sentinel Software Protection	239
-----	----------------------	--------------------------------------	-----

REMOTE COMPUTING

0	Apple Computer	Newton Message Pad 2000	67
896	Eicon Technology	Diva	NE26
296	McAfee Associates, Inc.	VirusScan	229
0	US Robotics Inc.	X2	11
0	US Robotics Inc.	Modems	56-57
0	US Robotics Inc.	Video	82-83
0	USR/Palm Computing Inc.	Pilot Organizer	194

Advertisers' Index PRODUCTS

Reader Service

No.	Company	Product	Page
113	Xircom	Ethernet Adapter	25
SCANNERS			
113	AGFA	AGFA Scanners	197
048	Epson America	Epson Scanner	31
163	Hewlett Packard	HP Voltera	220-221
163	Xerox Corporation	Textbridge Pro 96	371
SECURITY			
007	Rainbow Technologies	Rainbow Sentinel Software Protection	239
081	Raptor Systems	Network Security	152
SERVERS			
924	Dell Computer Corporation	Dimension/Latitude/PowerEdge Servers	C5-C8
924	Dell Computer Corporation	Latitude	12-13
924	Dell Computer Corporation	Dimension	178-179
924	Dell Computer Corporation	PowerEdge	38-39
924	Dell Computer Corporation	PowerEdge	72
924	Digital Equipment Corp.	Digital PCs	NE27
924	Micron Electronics	Vetix with ClientPro	NE2-NE3
924	Oracle Corp.	Oracle 7	NE5
886	QUALCOMM INC.	Eudora Mail Server	NE7
309	S.A.G./Storage Solutions	Servers and Storage	55
SOFTWARE			
299	McAfee Associates, Inc.	VirusScan	229
003	Micro Warehouse	Hardware, Software, Systems	316-317
047	Microsoft	Microsoft Office	2-3
092	PCs Complete	PCs, Peripherals, Software	314-315
192	PCs Complete	PCs, Notebooks, Software	292-293
268	PCs Complete	PCs, Notebooks, Software	294-295
268	PCs Complete	PCs, Notebooks, Software	296
268	SPSS, Inc.	SPSS 7.5 for Windows	308
268	Symantec Corporation	Norton Utilities	140
SPREADSHEET/TEMPLATES			
003	Lotus Development Corporation	Lotus SmartSuite	22-23
STATISTICAL SOFTWARE			
003	SPSS, Inc.	SPSS 7.5 for Windows	308
UTILITIES			
299	McAfee Associates, Inc.	VirusScan	229
880	Quarterdeck Office Systems	Networking Software	NE23
007	Rainbow Technologies	Rainbow Sentinel Software Protection	239
VIDEO GRAPHICS/BOARDS			
003	Diamond Multimedia Systems	Stealth Graphics Boards	135
003	Diamond Multimedia Systems	SCSI	137
WIN 95			
064	Advanced Logic Research	Optima MMX	238
177	Cardiff Software	Teleforms	240
017	Connectix	Color QuickCam	241
008	DataViz	Desktops	257
102	DataViz	Web Buddy	259
272	Decisive Technology	Shock	244
213	Executive Software	Diskeeper	230
026	Graphsoft, Inc.	MiniCAD 6	248
063	Helix Software Co.	Hurricane	242-243
143	Hitech	Monitors	265
024	In Focus Systems	Projector	271
390	In Focus Systems	Projector	273
106	Kingston Technology	Memory	246-247
264	KSL Monitor	Monitors	245
144	Logitech	PageScan Color Pro	278
344	Macromedia	Director	272
173	MapInfo Corp.	Mapping Software	260
130	Memory Express	Memory	266
280	MGI Software Corporation	PhotoSuite	274
086	Mitsubishi Electronic America, Inc.	Monitors	250
171	NewSoft, Inc.	Presto! PageManager	261
131	PictureTel	Video Conferencing	276
176	Portrait Display Labs	Pivot 1700 Monitors	258
125	PowerQuest	PartitionMagic	253
132	PowerQuest	DriveCopy	255
310	Proxima	Lightbook	263
146	QMS	Printers	264
030	Sceptre Technologies	Notebook Computers	275
316	Smith Micro Software, Inc.	Utilities	249
066	Sys Technology	PCs and Peripherals	270
088	Tiger Software/BLOC Publishing Corp.	Software	268-269
088	Traveling Software	Laplink for Windows 95	262
088	Traveling Software	LapLink to Windows	262
212	Utopia	Monitors	277
243	Viagrafix	Design CAD97	267
384	Western Digital Corp.	Hard Drives	233
115	Western Digital Corp.	Hard Drives	235
WINDOWS SOFTWARE			
362	Corel Corporation	CWPS7 Vertical Suites	104
044	Corel Corporation	CWS7/OP7 JAVA 2	185
042	Corel Corporation	Draw 7 simply outstanding	219
103	Corel Corporation	Internet	357
207	Corel Corporation	Corel Lumiere	361
037	Corel Corporation	Ventura Quotes	372
299	Lotus Development Corporation	Lotus SmartSuite	22-23
299	McAfee Associates, Inc.	VirusScan	229
299	Micrografx	Flowcharter 7	71
299	Microsoft	Microsoft Office	2-3
299	SPSS, Inc.	SPSS 7.5 for Windows	308
299	Symantec Corporation	Norton Utilities	140
299	Symantec Corporation	Norton AntiVirus	140
163	Xerox Corporation	Textbridge Pro 96	371
WORD PROCESSING SOFTWARE			
003	Lotus Development Corporation	Lotus SmartSuite	22-23
WORKSTATIONS			
003	Leap Frog Labs	Desktops & Notebooks	298-299

Coming Up

What's in the Next Issue of PC Magazine

What Can Java Do for You?

"Develop once, run many" is the mantra of Java devotees—but how close does this cross-platform programming language come to meeting expectations? We review shipping and beta applets and also take a look at Java virtual machines.

Groupware Adopts the Best of the Net

Once proprietary, groupware packages are opening up to the Internet's protocols. We take an in-depth look at Lotus's Domino, Novell's GroupWise, Microsoft Exchange Server, and Netscape SuiteSpot. We also review Web-based groupware packages and Internet mail and news servers that let you construct completely Internet-based environments.

Getting Set Up on the Web

How can you figure out which combination of hardware and software is the best Web server solution for your company? Let us take you on a tour of hardware platforms and software packages, including Apache, Microsoft Internet Information, and ServerNetscape Enterprise Server.



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For Additional Categories see MARKETPLACE PRODUCT INDEX PAGE, 326.

Editorial Product Index

Reader Service No.	Product	Company	Page
465	America Online 3.0	America Online Inc.	143
441	Avatar Peripherals Shark 250	Avatar Peripherals Inc.	172
441	Avatar Systems AR-321ONS	Avatar Systems Corp.	172
455	Big Business for Windows 2.0	Big Software Inc.	205
405	Borland C++Builder Client/Server 1.0	Borland International Inc.	70
407	Corel WordPerfect Suite for DOS	Corel Corp.	62
408	Courier V.Everything 56K	U.S. Robotics Inc.	49
466	CSI 3.0	CompuServe Inc.	150
456	DacEasy Accounting & Payroll for Windows 95 3	DacEasy Inc.	206
456	DacEasy Instant Accounting 2.1	DacEasy Inc.	209
956	Diva Pro 2.0	Eicon Technology Corp.	NE19
409	ELLiVision Gamma	ELLi Corp.	45
469	Exabyte Eagle TR-4i Nest	Exabyte Corp.	174
442	Fujitsu Dynamo 230 Portable PC Card Drive	Fujitsu Computer Products of America Inc.	176
442	Fujitsu Dynamo 640	Fujitsu Computer Products of America Inc.	176
410	Gateway Destination D5-200	Gateway 2000	45
457	Great Plains Profit 2.10	Great Plains Software	209
443	HP SureStore Optical 2600fx Multifunction Disk Drive	Hewlett-Packard Co.	176
444	IomegaJaz Drive	Iomega Corp.	180
444	Iomega Zip Drive	Iomega Corp.	180
951	LittleBrother Pro, Version 1.0	Kansmen Corp.	NE9
406	Lotus SmartSuite 97	Lotus Development Corp.	62
445	Maxoptix T4-2600	Maxoptix Corp.	184
446	MDI SCSI Express 2600SL	MicroDesign International Inc.	187
470	MicroNet DataDock	MicroNet Technology Inc.	174
467	The Microsoft Network	Microsoft Corp.	154
404	Microsoft Visual C++ 5.0, Enterprise Edition	Microsoft Corp.	70
402	Mountain High Maps Frontiers	Digital Wisdom Inc.	58
458	M.Y.O.B. Accounting 7.0	BestWare Inc.	212
401	NEC Versa 6200 with MMX Technology	NEC Technologies Inc., Computer Systems Division	58
411	NetTV WorldVision 2900	NetTV Inc.	45
447	Nomai 540	Nomai USA	187
448	Olympus PowerMO 2600/SCSI	Olympus America Inc.	188
448	Olympus SYS.230 Universal	Olympus America Inc.	188
403	Omnifile Pro	Computer Interface Corp.	73
459	One-Write Plus 6.0	Peachtree Software	212
952	ON Guard Internet Manager, Version 2.5	ON Technology Corp.	NE9
449	O.R. Technology a:drive	O.R. Technology Inc.	188
460	Pacioli 2000 4.1	M-USA Business Systems Inc.	215
450	Panasonic PD Drive	Panasonic Computer Peripheral Co.	191
461	Peachtree Complete Accounting for Windows 4.0	Peachtree Software	216
461	Peachtree First Accounting 2.0 for Windows	Peachtree Software	218
451	Pinnacle Micro Apex 4.6 GB	Pinnacle Micro Inc.	191
451	Pinnacle Micro Tahoe 640 MB	Pinnacle Micro Inc.	191
468	Prodigy Internet 1.1	Prodigy Inc.	159
462	QuickBooks Pro 5.0 for Windows	Intuit Inc.	218
463	Simply Accounting for Windows 5.0	Accpac International	220
953	SmartFilter 1.0	Secure Computing Corp., Web Tools Division	NE10
452	Sony CMO-R540-10	Sony Electronics Inc.	193
452	Sony SDT-2000E	Sony Electronics Inc.	193
452	Sony Sprezza CSP-9411-S	Sony Electronics Inc.	193
408	Sportster 56K Faxmodem	U.S. Robotics Inc.	49
954	SurfWatch ProServer	Spyglass Inc.	NE14
453	SyQuest EZFlyer 230	SyQuest Technology Inc.	195
453	SyQuest SyJet	SyQuest Technology Inc.	195
957	TigerJet 128K PCI ISDN Modem	TigerJet Network Inc.	NE19
454	Toray Phasewriter DUAL	Toray Optical Storage Solutions	196
412	Toshiba Infinia 7201	Toshiba America Information Service	45
955	WebSense, Version 3.0	NetPartners Internet Solutions Inc.	NE14

NE—Network Edition.

For information about the Network Edition of *PC Magazine*, call Circulation at 800-289-0429.

Abort, Retry, Fail?

THE LIGHTER SIDE OF PERSONAL COMPUTING

By Don Willmott

Green Thumb? More like All Thumbs



"Most garden software is installed onto your hard drive from hard disks. Many require Microsoft Windows 3.1 or newer—the market changes quickly."—*Garden, Deck, & Landscape Planner*

Truth in  advertising. (Fort Monmouth Technology Expo '96 brochure.)

- Networking Applications
- Video Teleconferencing
- Desktops /Laptops/Notebooks
- Records Management
- Forms Software
- Imaging
- Presentation Systems
- Communications
- Deplorable Equipment
- Software / Hardware & Much More

Maybe it  should say "open coffin" instead. (Computer City ad.)

"OPEN BOX"
Demon Clearance
SALE
Correct values
Limited Selection

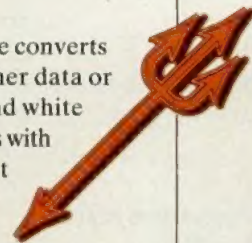
There'll Always Be an England

Public relations agent Jonathan Hirshon sent an e-mail message to Great Britain, and when it bounced back after a failed delivery attempt, it was accompanied by an error message that was truly British in its politeness: "This is the maildirbounce program. I'm afraid I wasn't able to deliver your message to the following address. This is a permanent error; I've given up. Sorry it didn't work out."

If your entry is used, we'll send you \$50 and a *PC Magazine* T-shirt. Send your entries to Abort, Retry, Fail?, *PC Magazine*, One Park Ave., New York, NY 10016-5802 or, via e-mail (text items only), to don_willmott@zd.com. Winners this issue: Pat Blais, Zachary Chan, Barry Dacks, Jonathan Hirshon, D. Lee Petersen, Alison Scott, and Kevin Shelly. Green thumb logo courtesy of Justice Records.

Satan on Sale

"The PaperPort software converts the graven image to either data or graphics files—black and white only. The keyboard works with any PC."—Northwest Airlines' *World Traveler*



CTAR BUSINESS CRITICAL BACKUP	Protecting Thousands of Fortune 500 Companies' Data Every Night ---- Worry Free!
--	--

So how many companies are there in the Fortune 500? (CTAR ad.)

How Attractive!

Faithful ARF reader Alison Scott bought her son a very strong magnet for Christmas—so strong, in fact, that it could pull scissors across a countertop. And guess what they found inside the box when they opened it? An America Online sign-up floppy disk, with 50 free hours included. Such a deal.



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MOVING VIOLATION D-1M1997

SPEED: 166 MHz
NAME: Dell
MODEL/YEAR: Latitude LM/1997
COLOR: 64,000
HIGHEST POWER: 128-bit graphics accelerator
DRIVE: 10X CD ROM
ENGINE: MMX Technology
LOCATION: Austin, Texas
VIOLATION: Operating at speeds that could
humiliate other notebooks.
OFFICIAL: [Signature]
X

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* PC MAGAZINE

- BEST PENTIUM PC OF 1996 - XPS line
- EDITORS' CHOICE AWARD - XPS Pro200n
- EDITORS' CHOICE AWARD - XPS P200s
- EDITORS' CHOICE AWARD - XPS P133c

* PC COMPUTING

- MVP WORKHORSE DESKTOP - XPS P200s
- 4 STAR AWARD - XPS P200s
- 4 STAR AWARD - XPS Pro200n
- BEST AWARD - XPS P166c
- 4 STAR AWARD - XPS P166c
- 4 STAR AWARD - P100t

* PC WORLD

- 4-time POWER DESKTOP BEST BUY - XPS P200s
- 5-time POWER DESKTOP BEST BUY - XPS Pro200n
- HOME DESKTOP BEST BUY - P200v
- BUDGET DESKTOP BEST BUY - P200v
- BUDGET DESKTOP BEST BUY - P133v
- 5-time BUDGET DESKTOP BEST BUY - P75t
- 8-time POWER DESKTOP BEST BUY - XPS P133c
- BUDGET DESKTOP BEST BUY - P100t
- HOME DESKTOP BEST BUY - P100t
- 5-time BUDGET DESKTOP BEST BUY - XPS P120c
- POWER DESKTOP BEST BUY - XPS P90c
- BUDGET DESKTOP BEST BUY - XPS P90c
- POWER DESKTOP BEST BUY - XPS P166c

* WINDOWS MAGAZINE

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